

JAPANESE

[JP,11-313358,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE
INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] The migration machine in a fixed zone, and the base station which performs control and a communication link of the migration machine via a wireless circuit, To the communication network which consists of the crossover exchange which sets up the suitable communication path of the switched network which reaches the optimal base station for said migration machines In the mobile communication network control device which transmits the fixed-length or variable-length packet which has the header information of a fixed form as communication link information said crossover exchange A multi-pass connection setting means to set up the multi-pass connection of addressing to the aforementioned migration machine via a circumference zone base station which addressing to the aforementioned migration machine via a ** area zone base station and said migration machine may move, An identification information addition means to add the identification information which shows that the packet by which flooding is carried out to the multi-pass connection is the same to the packet, Except for said ** area zone base station course of said migration machine, it has a packet delay means to delay the packet which transmits the multi-pass connection top via said circumference zone base station who may move. Said migration machine is a mobile communication network control unit characterized by having a receiving sequence control means to discard a duplication receive packet, with reference to said identification information of the packet received from said ** area zone base station and said circumference zone base station.

[Claim 2] The normal mode in the condition that the migration machine is fixed to a migration machine and the crossover exchange in the ** area zone, It has the hand-over mode of the condition that possibility that the migration machine will escape from a ** area zone, and hand-over will occur is high. Said migration machine A zone migration detection means to detect whether possibility that the migration machine concerned will escape from a ** area zone is high, When it is judged that possibility that detection by said zone migration detection means will escape from a ** area zone at the time of the normal mode is in a high condition, while transmitting a zone escape preliminary announcement message to said crossover exchange The zone escape preliminary announcement message notification means which makes the migration machine concerned hand-over mode, When it is judged that it is in the condition to which detection by said zone migration detection means was fixed to the ** area zone at the time of hand-over mode, while transmitting a zone fixing message to said crossover exchange It has the zone fixing message notification means which makes the migration machine concerned the normal mode. Said crossover exchange According to reception of a zone escape preliminary announcement message and a zone fixing message, hand-over mode or the normal mode is recognized. At the time of hand-over mode with a multi-pass connection setting means While setting up the multi-pass connection of addressing to the aforementioned migration machine via a circumference zone base station which addressing to the aforementioned migration machine via a ** area zone base station and said migration machine may move With an identification information addition means, the packet by which flooding is carried out to the multi-pass connection adds the identification information which shows the same thing to the packet. With a packet delay means Except for the ** area zone base station course of the migration machine,

the packet which transmits the multi-pass connection top via a circumference zone base station who may move is delayed. At the time of the normal mode with a multi-pass connection setting means The mobile communication network control unit according to claim 1 characterized by stopping addition to the packet of the identification information by the identification information addition means while setting up the connection only addressed to the aforementioned migration machine via a ** area zone base station.

[Claim 3] [whether the crossover exchange is severely required from packet disappearance for every addressing connection to a migration machine, and] It has a 1st communication link quality storage means by which the communication link quality of whether to be severely required from packet delay was memorized. The communication link quality demanded of the connection at the time of hand-over mode receives packet disappearance. When severe, with a packet delay means The packet which transmits the multi-pass connection top via a circumference zone base station is delayed. The mobile communication network control unit according to claim 2 with which communication link quality demanded of the connection is characterized by stopping delay of the packet by the packet delay means to packet delay when severe.

[Claim 4] A migration machine is a mobile communication network control unit according to claim 2 or 3 characterized by having the packet ejection means which can be freely adjusted to arbitration for the ejection time interval of the packet accumulated in a buffer means to accumulate the received packet, and its buffer means.

[Claim 5] It is the mobile communication network control unit according to claim 4 which a migration machine has a 2nd communication link quality storage means by which the communication link quality of whether to connect a buffer means and a packet ejection means for every connection was memorized, and is characterized by connecting these buffer means and a packet ejection means based on the 2nd communication link quality storage means for every connection.

[Claim 6] A migration machine measures the signal state received from a ** area zone base station and a circumference zone base station. It has a migration place zone prediction means to predict a migration place zone. A zone escape preliminary announcement message notification means The migration place zone predicted by said migration place zone prediction means is added to a zone escape preliminary announcement message, and it transmits to the crossover exchange. The crossover exchange A mobile communication network control unit given [of claim 2 to the claims 5 characterized by determining the circumference zone which should set up a multi-pass connection according to the migration place zone in the received zone escape preliminary announcement message] in any 1 term.

[Claim 7] A migration machine and a base station are equipped with a positional information receiving means to receive the positional information of these migration machine by location gaging systems, such as GPS, and a base station. Said base station Based on the received positional information, it has a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of the base station to said migration machine in the zone of the base station concerned. The zone migration detection means of said migration machine The positional information of the migration machine concerned received from the positional information and the effective zone distance, and said location gaging system of said base station of the received base station positional information message A mobile communication network control unit given [of claim 2 to the claims 5 characterized by judging the existence of possibility of it being alike, and responding and escaping from a ** area zone] in any 1 term.

[Claim 8] A migration machine and a base station are equipped with a positional information receiving means to receive the positional information of these migration machine by location gaging systems, such as GPS, and a base station. Said base station Based on the received positional information, it has a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of the base station to said migration machine of a ** area zone and a circumference zone. When the zone migration detection means of said migration machine had

high possibility that the migration machine concerned will escape from a ** area zone and it detects A migration place zone is predicted according to the positional information of the migration machine concerned received from the positional information and the effective zone distance, and said location gaging system of said base station of the received base station positional information message. The mobile communication network control unit according to claim 6 characterized by adding the predicted migration place zone to a zone escape preliminary announcement message, and transmitting to it at the crossover exchange.

[Claim 9] A migration machine and a base station are equipped with a positional information receiving means to receive the positional information of these migration machine by location gaging systems, such as GPS, and a base station. Said each base station While notifying the base station positional information message which shows the positional information and effective zone distance of the base station concerned to a circumference zone base station based on the received positional information It has a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of the base station concerned and a circumference zone base station to the migration machine of the ** area zone concerned. When the zone migration detection means of said migration machine had high possibility that the migration machine concerned will escape from a ** area zone and it detects A migration place zone is predicted according to the positional information of the migration machine concerned received from the positional information and the effective zone distance, and said location gaging system of said base station of the received base station positional information message, and a circumference zone base station. The mobile communication network control unit according to claim 6 characterized by adding the predicted migration place zone to a zone escape preliminary announcement message, and transmitting to it at the crossover exchange.

[Claim 10] The migration direction of the migration machine [in / based on the positional information of the base station of the zone which passed the migration machine until now according to the received base station positional information message / a ** area zone] concerned, It has a migration direction recognition means to recognize the migration direction of the migration machine based on the positional information of the migration machine concerned by location gaging systems, such as GPS, from continuity with the migration direction of the migration machine in a ** area zone. When the zone migration detection means of said migration machine had high possibility that the migration machine concerned will escape from a ** area zone and it detects A migration place zone is predicted according to the migration direction of the migration machine recognized by the migration direction recognition means. A mobile communication network control unit given [of claim 7 to the claims 9 characterized by adding the predicted migration place zone to a zone escape preliminary announcement message, and transmitting to it at the crossover exchange] in any 1 term.

[Claim 11] The passing speed of the migration machine [in / based on the positional information of the base station of the zone which passed the migration machine until now according to the received base station positional information message / a ** area zone] concerned, It has a passing speed recognition means to recognize the passing speed of the migration machine based on the positional information of the migration machine concerned by location gaging systems, such as GPS, from continuity with the passing speed of the migration machine in a ** area zone. The zone migration detection means of said migration machine has high possibility that the migration machine concerned will escape from a ** area zone. And when it is judged that the passing speed recognized by said passing speed recognition means is high The migration place zone which adjoins the migration place zone by migration of the migration place zone which adjoins a ** area zone according to the migration direction of the migration machine recognized by the migration direction recognition means, and after that is predicted. The mobile communication network control unit according to claim 10 characterized by adding these predicted migration place zone to a zone escape preliminary announcement message, and transmitting to it at the crossover exchange.

[Claim 12] While a migration machine recognizes the migration direction and passing speed of the migration machine in a ** area zone based on the positional information of the migration machine

concerned by location gaging systems, such as GPS A migration machine information message transmitting means to transmit to the crossover exchange by making the migration direction and passing speed of these migration machine into a migration machine information message, When possibility that the migration machine concerned will escape from a ** area zone was high and it detects It has a zone escape preliminary announcement message notification means to transmit to the crossover exchange as a zone escape preliminary announcement message which added the migration direction and passing speed of a migration machine in the ** area zone. The migration direction and passing speed of the migration machine according to the migration machine information message by which the crossover exchange was received, And it is based on the migration direction and passing speed of the migration machine according to the received zone escape preliminary announcement message. When it judges whether the migration direction and the continuity of passing speed, and its passing speed are high and it is judged that passing speed is high The migration place zone which adjoins the migration place zone by migration of the migration place zone which adjoins a ** area zone according to the migration direction of the migration machine, and after that is predicted. A mobile communication network control unit given [of claim 7 to the claims 9 characterized by determining the circumference zone which should set up a multi-pass connection according to these migration place zone] in any 1 term.

[Claim 13] An identification information addition means is a mobile communication network control unit given [of claim 1 to the claims 12 characterized by counting up while adding the value of said counter means as said identification information, and using the sequence number as an identification number in case it has the counter means of sufficient modulo which generates identification information and the copy transfer of the packet is carried out in each multi-pass connection from the crossover exchange] in any 1 term.

[Claim 14] An identification information addition means is a mobile communication network control unit given [of claim 1 to the claims 12 characterized by adding the time information of said clock means as said identification information, and using time information as an identification number in case it has the clock means of a precision required for the crossover exchange which generates identification information and the copy transfer of the packet is carried out in each multi-pass connection from the crossover exchange] in any 1 term.

[Claim 15] A multi-pass connection setting means With the connection addressed to the migration machine via a ** area zone base station It branches on two connections of the connection of addressing to the aforementioned migration machine via a circumference zone base station which a migration machine may move. It has a 1st packet branching means to copy a packet and to transmit to these two connections. A packet delay means It has a packet delay buffer means to realize packet delay, about said connection addressed to the aforementioned migration machine via a circumference zone base station. When there are two or more circumference zone base stations where a migration machine may move further, a multi-pass connection setting means A mobile communication network control unit given [of claim 1 to the claims 12 characterized by having the 2nd packet branching means which copies said delayed packet according to the plurality] in any 1 term.

[Claim 16] A mobile communication network control unit given [of claim 1 to the claims 15 characterized by using the equipment having the function of a base station and the crossover exchange as a base station and the crossover exchange] in any 1 term.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates to the mobile communication network control unit in the case of transmitting the information on voice, data, etc. as fixed-length or variable-length a packet and an ATM cel with the header information of a fixed form in the mobile communication network which consists of the crossover exchange which sets up the suitable communication path of the switched network which reaches the migration machine in a fixed zone, the base station which performs control and a communication link of that migration machine via a wireless circuit, and the optimal base station for migration machines.

[0002]

[Description of the Prior Art] Drawing 19 is the block block diagram showing the conventional mobile communication network control device shown in JP,5-91555,A, and he is the crossover exchange where the base station in which 100-1 to 100-3 forms a wireless zone in, and 101-1 to 101-3 forms the wireless zone 100-1 to 100-3, and 103 control a migration machine, and 104 controls a base station 101-1 to 101-3 in drawing. Here, the migration machine 103 communicates, switching a base station 101-1 to 101-3, and a communication channel.

[0003] Next, actuation is explained. While the migration machine 103 communicates with the ** area zone base station 101-1, when moving, the communication channel of the circumference zone base station 101-2,101-3 is reserved. Moreover, when detection of communication link quality degradation of the ** area zone base station 101-1 performs a channel switch, a channel switch is performed to the channel by which the circumference zone base station 101-2 or 101-3 was reserved.

[0004]

[Problem(s) to be Solved by the Invention] Since the conventional mobile communication network control unit was constituted as mentioned above, it had the technical problem that communication link information disappeared with the migration place zone base station 101-2 or switch processing of the connection of 101-3 from the ** area zone base station 101-1. Increase of the amount of information which suffers a loss according to disappearance of a packet or an ATM cel when transmitting the information on voice or data to a high speed in a format like a packet or an ATM cel especially was remarkable, and when the migration machine 103 moved to a high speed, or when a zone region was set up small, technical problems, such as becoming the factor which switch processings occur [factor] frequently and degrades communication link quality greatly, occurred.

[0005] It was made in order that this invention might solve the above technical problems, and it aims at obtaining the mobile communication network control unit which prevents disappearance of the communication link information accompanying a switch of the communication path from the crossover exchange to a base station in a high-speed communication link, high-speed migration, and the switch control in the narrow mobile communication network of a zone field.

[0006]

[Means for Solving the Problem] The mobile communication network control device concerning this invention to the crossover exchange A multi-pass connection setting means to set up the

multi-pass connection of addressing to the migration machine via a circumference zone base station which addressing to the migration machine via a ** area zone base station and a migration machine may move, An identification information addition means to add to a packet the identification information which shows that the packet by which flooding is carried out to the multi-pass connection is the same, Except for the ** area zone base station course of a migration machine, it has a packet delay means to delay the packet which transmits the multi-pass connection top via a circumference zone base station. A migration machine is equipped with a receiving sequence control means to discard a duplication receive packet, with reference to the identification information of the packet received from a ** area zone base station and a circumference zone base station.

[0007] The mobile communication network control device concerning this invention in a migration machine and the crossover exchange It has the normal mode in the condition that the migration machine is fixed to the ** area zone, and the hand-over mode of the condition that possibility that a migration machine will escape from a ** area zone, and hand-over will occur is high. A migration machine A zone migration detection means to detect whether possibility that a migration machine will escape from a ** area zone is high, When it is judged that possibility that detection by the zone migration detection means will escape from a ** area zone at the time of the normal mode is in a high condition, while transmitting a zone escape preliminary announcement message to the crossover exchange The zone escape preliminary announcement message notification means which makes a migration machine hand-over mode, When it is judged that it is in the condition to which detection by the zone migration detection means was fixed to the ** area zone at the time of hand-over mode, while transmitting a zone fixing message to the crossover exchange It has the zone fixing message notification means which makes a migration machine the normal mode. The crossover exchange According to reception of a zone escape preliminary announcement message and a zone fixing message, hand-over mode or the normal mode is recognized. At the time of hand-over mode with a multi-pass connection setting means While setting up the multi-pass connection of addressing to the migration machine via a ** area zone base station, and addressing to the migration machine via a circumference zone base station With an identification information addition means, the packet by which flooding is carried out to a multi-pass connection adds the identification information which shows the same thing to a packet. With a packet delay means Except for the ** area zone base station course of a migration machine, the packet which transmits the multi-pass connection top via a circumference zone base station is delayed. At the time of the normal mode with a multi-pass connection setting means While setting up the connection only addressed to the migration machine via a ** area zone base station, addition to the packet of the identification information by the identification information addition means is stopped.

[0008] The mobile communication network control device concerning this invention to the crossover exchange [whether it is severely required from packet disappearance for every addressing connection to a migration machine, and] It has a 1st communication link quality storage means by which the communication link quality of whether to be severely required from packet delay was memorized. The communication link quality demanded of the connection at the time of hand-over mode receives packet disappearance. When severe, with a packet delay means The packet which transmits the multi-pass connection top via a circumference zone base station is delayed, and to packet delay, the communication link quality demanded of the connection stops delay of the packet by the packet delay means, when severe.

[0009] The mobile communication network control device concerning this invention is equipped with the packet ejection means which can be freely adjusted to arbitration for the ejection time interval of the packet accumulated in a buffer means to accumulate the received packet in a migration machine, and its buffer means.

[0010] The mobile communication network control device concerning this invention has a 2nd communication link quality storage means by which the communication link quality of whether to connect a buffer means and a packet ejection means to a migration machine for every connection was memorized, and a buffer means and a packet ejection means are connected based on the 2nd communication link quality storage means for every connection.

[0011] The mobile communication network control unit concerning this invention measures the signal state received from a ** area zone base station and a circumference zone base station to a migration machine. It has a migration place zone prediction means to predict a migration place zone. A zone escape preliminary announcement message notification means The migration place zone predicted by the migration place zone prediction means is added to a zone escape preliminary announcement message, and it transmits to the crossover exchange. The crossover exchange The circumference zone which should set up a multi-pass connection according to the migration place zone in the received zone escape preliminary announcement message is determined.

[0012] The mobile communication network control unit concerning this invention equips a migration machine and a base station with a positional information receiving means to receive the positional information of the migration machine by location gaging systems, such as GPS, and a base station. A base station is equipped with a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of a base station to the migration machine in the zone of a base station, based on the received positional information. The zone migration detection means of a migration machine judges the existence of possibility of escaping from a ** area zone according to the positional information of the migration machine received from the positional information and the effective zone distance, and the location gaging system of a base station of the received base station positional information message.

[0013] The mobile communication network control unit concerning this invention equips a migration machine and a base station with a positional information receiving means to receive the positional information of the migration machine by location gaging systems, such as GPS, and a base station. A base station is equipped with a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of a base station to the migration machine of a ** area zone and a circumference zone, based on the received positional information. When the zone migration detection means of a migration machine had high possibility that a migration machine will escape from a ** area zone and it detects A migration place zone is predicted according to the positional information of the migration machine received from the positional information and the effective zone distance, and the location gaging system of a base station of the received base station positional information message. The predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0014] The mobile communication network control unit concerning this invention a migration machine and a base station It has a positional information receiving means to receive the positional information of the migration machine by location gaging systems, such as GPS, and a base station. Each base station While notifying the base station positional information message which shows the positional information and effective zone distance of a base station to a circumference zone base station based on the received positional information It has a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of a base station and a circumference zone base station to the migration machine of a ** area zone. When the zone migration detection means of a migration machine had high possibility that a migration machine will escape from a ** area zone and it detects A migration place zone is predicted according to the positional information of the migration machine received from the positional information and the effective zone distance, and the location gaging system of the base station of the received base station positional information message, and a circumference zone base station. The predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0015] The migration direction of a migration machine [in / based on the positional information of the base station of the zone which passed the mobile communication network control device concerning this invention to the migration machine until now according to the received base station positional information message / a ** area zone], It has a migration direction recognition

means to recognize the migration direction of a migration machine based on the positional information of the migration machine by location gaging systems, such as GPS, from continuity with the migration direction of the migration machine in a ** area zone. When the zone migration detection means of a migration machine had high possibility that a migration machine will escape from a ** area zone and it detects A migration place zone is predicted according to the migration direction of the migration machine recognized by the migration direction recognition means, and the predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0016] The passing speed of a migration machine [in / based on the positional information of the base station of the zone which passed the mobile communication network control device concerning this invention to the migration machine until now according to the received base station positional information message / a ** area zone], It has a passing speed recognition means to recognize the passing speed of a migration machine based on the positional information of the migration machine by location gaging systems, such as GPS, from continuity with the passing speed of the migration machine in a ** area zone. The zone migration detection means of a migration machine has high possibility that a migration machine will escape from a ** area zone. And when it is judged that the passing speed recognized by the passing speed recognition means is high The migration place zone which adjoins a migration place zone by migration of the migration place zone which adjoins a ** area zone according to the migration direction of the migration machine recognized by the migration direction recognition means, and after that is predicted. The predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0017] While the mobile communication network control unit concerning this invention recognizes the migration direction and passing speed of a migration machine in a ** area zone to a migration machine based on the positional information of the migration machine by location gaging systems, such as GPS A migration machine information message transmitting means to transmit to the crossover exchange by making the migration direction and passing speed of a migration machine into a migration machine information message, When possibility that a migration machine will escape from a ** area zone was high and it detects, it has a zone escape preliminary announcement message notification means to transmit to the crossover exchange as a zone escape preliminary announcement message which added the migration direction and passing speed of a migration machine in a ** area zone. The crossover exchange The migration direction and passing speed of the migration machine according to the received migration machine information message, And it is based on the migration direction and passing speed of the migration machine according to the received zone escape preliminary announcement message. When it judges whether the migration direction and the continuity of passing speed, and its passing speed are high and it is judged that passing speed is high The migration place zone which adjoins a migration place zone by migration of the migration place zone which adjoins a ** area zone according to the migration direction of a migration machine, and after that is predicted, and the circumference zone which should set up a multi-pass connection according to these migration place zone is determined.

[0018] In case the mobile communication network control device concerning this invention has the counter means of sufficient modulo which generates identification information and carries out the copy transfer of the packet in each multi-pass connection from the crossover exchange, it is counted up for it while it adds the value of a counter means to an identification information addition means as identification information, and uses the sequence number for it as an identification number.

[0019] In case the mobile communication network control device concerning this invention has the clock means of a precision required for the crossover exchange which generates identification information and carries out the copy transfer of the packet in each multi-pass connection from the crossover exchange, it adds the time information of a clock means to an identification information addition means as identification information, and uses time information for it as an identification number.

[0020] The mobile communication network control device concerning this invention a multi-pass

connection setting means It branches on the connection addressed to the migration machine via a ** area zone base station, and two connections of the connection of addressing to the migration machine via a circumference zone base station which a migration machine may move. It has a 1st packet branching means to copy a packet and to transmit to these two connections. A packet delay means It has a packet delay buffer means to realize packet delay, about the connection addressed to the migration machine via a circumference zone base station. A multi-pass connection setting means has the 2nd packet branching means which copies the packet delayed according to the plurality, when there are two or more circumference zone base stations where a migration machine may move further.

[0021] The equipment having the function of a base station and the crossover exchange is used for the mobile communication network control device concerning this invention as a base station and the crossover exchange.

[0022]

[Embodiment of the Invention] Hereafter, one gestalt of implementation of this invention is explained.

Gestalt 1. drawing 1 of operation is the block block diagram showing the mobile communication network control device by the gestalt 1 of implementation of this invention, and is set to drawing. The crossover exchange which sets up a communication path with the mobile switched network suitable for 1 which reaches the base station for migration machines, 2 is a base station which performs control and a communication link of a migration machine via the migration machine and wireless circuit in a fixed zone, among those, as for a ** area zone base station while a migration machine is communicating, 2-2, and 2-3, the migration machine of 2-1 is the circumference zone base station where it may move. 3 is a migration machine which continues a communication link by hand-over control (switch control), when moving in a mobile communication network between zones.

[0023] An identification information addition means add the identification information for recognizing that the interface between the exchanges with which 10 makes connection with other exchanges, and 11 have the same packet by which flooding is carried out to a multi-pass connection at the crossover exchange 1 to a packet, a multi-pass connection setting means control a setup of the connection who does flooding of 12, and 13 are a packet delay means transmit to the path addressed to a base station, after carrying out a fixed time-amount hold only of a required connection's packet. Moreover, in the migration machine 3, a receiving sequence control means to prepare the sequence of a receive packet with reference to the identification information by which 15 was added to the receive packet, and 16 are high order processing means to perform processing, transmitting and receiving data.

[0024] Drawing 2 is a sequence when it is the sequence diagram showing actuation of the mobile communication network control unit by the gestalt 1 of implementation of this invention, the migration machine 3 moves in a zone in the mobile communication network control unit by drawing 1 R> 1 and hand-over control is performed. Drawing 3 is the block block diagram showing an example of the identification information addition means of the crossover exchange, and the packet buffer in which 20 stores packet information, and 21 are counter means to generate identification information, in drawing. Drawing 4 R> 4 is the block block diagram showing other examples of the identification information addition means of the crossover exchange, and 22 is a clock means with sufficient precision to identify the packet processed sequentially in drawing.

[0025] Drawing 5 is the block block diagram showing an example of the multi-pass connection setting means of the crossover exchange, and a packet delay means, and is set to drawing. The multi-pass connection setting control means by which 25 controls a setup of the multi-pass connection to the addressing connection to ** area zone base station 2-1 and the circumference zone base station 2-2, and the addressing connection to 2-3, A packet delay buffer means by which 26 delays the packet of the circumference zone base station 2-2 and the addressing connection to 2-3, 27 each base station 2 A transmitting processing means to transmit a packet for turning, a 1st packet branching means by which 28 branches the addressing connection to ** area zone base station 2-1, and the circumference zone base

station 2-2 and the addressing connection to 2-3, 29 is a 2nd packet branching means to branch two or more circumference zone base stations 2-2 and the addressing connection to 2-3.

[0026] Next, actuation is explained. First, in drawing 1, actuation of a mobile communication network control unit is explained. Drawing 1 is in the condition which is communicating by locating the migration machine 3 in the zone which the ** area zone base station 2-1 serves, and the crossover exchange 1 which manages the migration machine 3 receives the packet addressed to migration machine 3 through the interface 10 between the exchanges from the adjoining exchange. Then, the identification information for recognizing that the packet by which flooding is carried out to a multi-pass connection is the same is added with the identification information addition means 11, and a packet is copied for each [which was set up by the multi-pass connection setting means 12] connection of every. The packet of the addressing connection to ** area zone base station 2-1 in which the migration machine 3 is located is transmitted immediately. Moreover, the packet of the circumference zone base station 2-2 where the migration machine 3 may move, and the addressing connection to 2-3 accumulates only the time amount specified as the packet delay means 13, and is transmitted after that through each circumference zone base station 2-2 and the addressing connection to 2-3. And the ** area zone base station 2-1 and the circumference zone base station 2-2, and 2-3 transmit the packet transmitted from the crossover exchange 1 to migration machine 3 through a wireless circuit. The migration machine 3 is passed to the high order processing means 16 of the migration machine 3 interior, after receiving the packet, having recognized the identification information of a receive packet in the receiving sequence control means 15, detecting the duplication reception and packet disappearance which are generated at the time of the hand-over of this method and controlling a packet as sequence.

[0027] In drawing 2, the migration machine 3 explains the packet sequence in the hand-over control which carries out zone migration from the zone of the ** area zone base station 2-1 in the circumference zone base station 2-2 in a mobile communication network. When the migration machine 3 is in the zone of the ** area zone base station 2-1, it is transmitted from the packet (1) crossover exchange 1 through the connection addressed to ** area zone base station 2-1 (one of the multi-pass connections), and through the radio channel which the migration machine 3 is using from the ** area zone base station 2-1, it is transmitted to the migration machine 3 and received. The crossover exchange 1 suspends a packet (1) for coincidence with the packet delay means 13 temporarily, and a packet (1) is discarded, when it is transmitted to each circumference zone base station 2-2 and 2-3 through the connection (one or more of a multi-pass connection) of the circumference zone base station 2-2 where the migration machine 3 may move after that, and addressing to 2-3 and there is no radio channel to the migration machine 3 in the base station. When it sets to the base station and the radio channel to the migration machine 3 is established or reserved, it is transmitted to the migration machine 3 through the radio channel which the migration machine 3 is using. The packet (2) to continue is similarly received by the migration machine 3 by ** area zone base station 2-1 course.

[0028] Then, the migration machine 3 interrupts the communication link with the ** area zone base station 2-1 for the reasons of communication link quality degradation etc., and starts the hand-over control changed to a communication channel with the good circumference zone base station 2-2 of communication link quality. In the meantime, release of a radio channel with the ** area zone base station 2-1, a setup of a radio channel with the circumference zone base station 2-2, information interchange between the migration machine 3 and the crossover exchange 1, etc. need to perform hand-over control, and the condition that packet communication is impossible generates them between the time amount which performs the processing. Although a packet (3) is transmitted from the crossover exchange 1 through the connection addressed to ** area zone base station 2-1 (one of the multi-pass connections) and it is transmitted by the radio channel which the migration machine 3 is using from the ** area zone base station 2-1 after hand-over control is started in the migration machine 3, since the migration machine 3 is contained in hand-over control, it will not be received but will disappear. Although future packets (4) and (5) are transmitted to the migration machine 3 by ** area zone base station 2-1 course, it will not be received but will disappear. The receive packet between hand-over control was

conventionally recovered in this way using the high order layer protocol which will not be disappeared and offered. However, when the migration machine 3 moves to a high speed, hand-over control comes to occur frequently, and in connection with transmission speed becoming a high speed at coincidence, the number of packets which disappears increases and becomes the big cause of communication link quality degradation.

[0029] After the same packet as packet (1) - (5) transmitted to the migration machine 3 by the two to ** area zone base station 1 course passes through the fixed time delay by the packet delay means 13, it constitutes from a gestalt 1 of this operation so that it may be transmitted by the multi-pass connection from the crossover exchange 1 to the circumference zone base station 2-2 and 2-3. The migration machine 3 ends said hand-over control, sets up a communication channel with the migration place zone base station (circumference zone base station in front of hand-over) 2-2, and starts a communication link. Then, by migration place zone base station 2-2 course, the packet (2) delayed with the packet delay means 13 of the crossover exchange 1 is transmitted to the migration machine 3, and is received. The migration machine 3 recognizes that it is a packet [finishing / reception] from the ** area zone base station 2-1 with reference to the identification information of a receive packet with the receiving sequence control means 15, and discards it as a duplication packet. Next, by migration place zone base station 2-2 course, packet (3) - (5) delayed with the packet delay means 13 of the crossover exchange 1 is transmitted to the migration machine 3, and is received. The migration machine 3 recognizes that it is the packet continued with reference to the identification information of a receive packet with the receiving sequence control means 15 to a packet [finishing / reception in the ** area zone 2-1], and passes it to the high order processing means 16.

[0030] As mentioned above, by setting up the multi-pass connection from the crossover exchange 1 to a circumference zone, delaying a packet, and transmitting, the packet disappearance by hand-over control is prevented, and the high communication link of quality can be continued.

[0031] Next, the identification information addition means 11 shown in drawing 3 is explained. The crossover exchange 1 has the counter means 21 of suitable magnitude as a generation means of the identification information added to a packet. When the addressing packet to migration machine 3 is received, a receive packet is stored in a packet buffer 20, the counter value by the counter means 21 is written in this suitable identification information field, and that counter means 21 is counted up. The packet to which this identification information was added is copied to each addressing to a base station by the multi-pass connection, and is transmitted.

[0032] As mentioned above, it is also possible to utilize for detection of a disappearance packet and the resending control between the crossover exchange 1 and the migration machine 3 at the same time the duplication packet in the migration machine 3 is detectable by using the round variable of a modulo suitable as identification information.

[0033] Next, the identification information addition means 11 shown in drawing 4 is explained. The crossover exchange 1 has the clock means 22 of sufficient precision for the packet which the crossover exchange 1 receives to be uniquely discriminable as a generation means of the identification information added to a packet. When the addressing packet to migration machine 3 is received, a receive packet is stored in a packet buffer 20, and the time information by the clock means 22 is written in this suitable identification information field. The packet to which this identification information was added is copied to each addressing to a base station by the multi-pass connection, and is transmitted.

[0034] As mentioned above, it is possible to utilize for the fluctuation amendment processing at the time of packet playback at the same time the duplication packet in the migration machine 3 is detectable by using the time information of a precision suitable as identification information.

[0035] Next, the multi-pass connection setting means 12 and the packet delay means 13 which were shown in drawing 5 are explained. In order that the crossover exchange 1 may branch the packet addressed to migration machine 3 for two connections, the connection who transmits by two to ** area zone base station 1 course, and the connection who transmits by one or more circumference zone base stations 2-2 and 2-3 course, a packet is copied with the 1st bucket

branching means 28. The packet for the connections who transmit by two to ** area zone base station 1 course is immediately transmitted from the transmitting processing means 27. The circumference zone base station 2-2 and the packet for the connections who transmit by 2-3 course were specified as a packet delay buffer means 26 to realize the packet delay means 13, and time amount are recording is carried out. Then, it is taken out from the packet delay buffer means 26, and in order to branch a packet according to the circumference zone base station 2-2 which should be transmitted, and the number of 2-3 for the circumference zone base station 2-2 and the connections for 2 to 3 minutes, a packet is copied with the 2nd packet branching means 29. The copied each packet is transmitted to each destination circumference zone base station 2-2 and 2-3 from the transmitting processing means 27. With the 1st packet branching means 28, whether it turns 2-3 and a connection is branched manages [the circumference zone base station 2-2, whether it turns 2-3 and a connection is branched, which circumference zone base station 2-2, and] in the multi-pass connection setting control means 25, and it directs branching control for the 1st packet branching means 28 and the 2nd packet branching means 29.

[0036] Thus, the memory space of the packet delay buffer means 26 which realizes the packet delay means 13 can be constituted few by having the 1st packet branching means 28 and the 2nd packet branching means 29.

[0037] The flow Fig. of operation at the time of the normal mode in the migration machine of the mobile communication network control unit according [gestalt 2. drawing 6 of operation] to the gestalt 2 of implementation of this invention, the flow Fig. of operation at the time of hand-over mode [in / in drawing 7 / a migration machine], the flow Fig. of operation at the time of the normal mode [in / in drawing 8 / the crossover exchange], and drawing 9 are the flow Figs. of operation at the time of the hand-over mode of the crossover exchange.

[0038] Next, actuation is explained. It has the normal mode fixed to a ** area zone — the migration machine 3 is standing it still in a zone, or is moving in the zone center section at a low speed — and the high hand-over mode of possibility that moving in the border area of a zone etc. will escape from a ** area zone, and hand-over will occur, as an internal state, and possibility of escaping from a ** area zone has a zone migration detection means to recognize a high thing. Next, drawing 6 explains actuation in case the migration machine 3 is the normal mode. When the possibility of ** area zone escape is judged with a zone migration detection means when the migration machine 3 is in the normal mode (step ST 1), and it is judged that the possibility of escape is high, the crossover exchange 1 is notified of a zone escape preliminary announcement message by two to ** area zone base station 1 course (a step ST 2, zone escape preliminary announcement message notification means). After judging that the possibility of escape is not high, or after transmitting a zone escape message, it judges [whether the identification information of a receive packet is significant, and] whether (step ST3) and the crossover exchange 1 recognize it as hand-over mode depending on whether it is non-mind. When the crossover exchange 1 recognizes it as identification information being significant and it being in hand-over mode about the applicable migration machine 3, the mode of the migration machine 3 is shifted to hand-over mode (step ST 4). When identification information is non-mind, it stops at the normal mode as it is. When stopping at the normal mode, the method of preventing frequent occurrence of a zone escape preliminary announcement message notification (step ST 2) is also effective.

[0039] Next, drawing 7 explains actuation in case the migration machine 3 is in hand-over mode. When ** area zone escape possibility was judged (step ST 11), and there is no possibility of escape and it is judged as fixing with a zone migration detection means, the crossover exchange 1 is notified of a zone fixing message by two to ** area zone base station 1 course (a step ST 12, zone fixing message notification means). When it is judged that the possibility of escape is high, or after transmitting a zone fixing message, it judges [whether the identification information of a receive packet is significant, and] whether (step ST13) and the crossover exchange 1 recognize it as hand-over mode depending on whether it is non-mind. Identification information is non-mind, and when the crossover exchange 1 recognizes the applicable migration machine 3 to be the normal mode, it shifts the mode of the migration machine 3 to the normal mode (step ST 14). When identification information is significant, it stops at hand-over mode as it is. When

stopping at hand-over mode, the method of preventing frequent occurrence of a zone fixing message notification (step ST 12) is also effective.

[0040] Next, the actuation in the crossover exchange 1 is explained. The normal mode fixed to a ** area zone — this migration machine 3 is standing it still in a zone, or is moving in the zone center section every migration machine 3 which the crossover exchange 1 manages at a low speed — It has the high hand-over mode of possibility that moving in the border area of a zone etc. will escape from a ** area zone, and hand-over will occur, as an internal state. With the mode of the migration machine 3 [whether only the connection of two to ** area zone base station 1 course is set up, and a packet is transmitted, and] It has the multi-pass connection setting means 12 which added the function which switches whether the ** area zone base station 2-1 and the circumference zone base station 2-2, and the multi-pass connection of 2-3 course are set up, and a packet is transmitted. Drawing 8 explains the actuation about the migration machine 3 of the normal mode in the crossover exchange 1. The crossover exchange 1 recognizes that possibility that will receive a zone escape preliminary announcement message (step ST 21), and the migration machine 3 will escape from a ** area zone is higher than the migration machine 3 in the normal mode. Next, with the identification information addition means 11, addition of the identification information to the packet addressed to migration machine 3 is started (step ST 22). Next, all the adjoining zones of for example, a ** area zone are chosen as a circumference zone where the migration machine 3 may move. The multi-pass connection to the each base station [of a ** area zone and a circumference zone] 2-1 - migration machine 3 via 2-3 is set up (step ST 23). It sets up so that the packet of the circumference zone base station 2-2 and the addressing connection to 2-3 may be delayed (step ST 24), and let the mode of the migration machine 3 be hand-over mode (step ST 25).

[0041] Next, drawing 9 explains the actuation about the migration machine 3 in the hand-over mode in the crossover exchange 1. The crossover exchange 1 recognizes that received the zone fixing message (step ST 31), and the migration machine 3 was fixed to the ** area zone from the migration machine 3 in hand-over mode. Next, with the identification information addition means 11, addition of the identification information to the packet addressed to migration machine 3 stops (step ST 32). Next, it leaves only the connection via the ** area zone base station in the time of the migration machine 3, and other circumference zone base stations 2-2 and the multi-pass connection of 2-3 course are released (step ST 33). And the delay gradually set as the applicable connection is decreased, and it goes (step ST 34), and let the mode of the migration machine 3 be the normal mode (step ST 35).

[0042] As mentioned above, it becomes possible to reduce the traffic volume in a mobile communication network by defining the normal mode and hand-over mode every migration machine 3 at the migration machine 3 and the crossover exchange 1, the possibility of hand-over setting up a multi-pass connection only to the high migration machine 3, and carrying out flooding of the packet, and setting up the usual connection to the migration machine 3 in the condition of having been fixed to the zone, and transmitting a packet. Moreover, although shift of the mode was judged in the migration machine 3 in the gestalt 2 of this operation by the existence of the identification information added to the packet, even if it judges shift of the mode using that information, the same effectiveness is expectable [means other than the identification information to which the mode information on the applicable migration machine 3 which the crossover exchange 1 recognizes was added by the packet notify, and].

[0043] Drawing 10 is the conceptual diagram showing the communication link quality storage table in the crossover exchange. The crossover exchange 1 memorizes the communication link quality for which it has a communication link quality storage table (the 1st communication link quality storage means) as shown in drawing 10, and the connection needs it for every base station to manage, migration machine which carries out a ** area to the base station, and communication link connection set as the migration machine. For example, as communication link quality, in the class of service of an ATM communication link, although delay is permissible, it can use the communication link quality of severe rtVBR and CBR for disappearance to delay rather than severe UBR, nrtVBR, and disappearance.

[0044] Next, actuation is explained. As explanation of drawing 9 of operation showed from

drawing 6 , when the crossover exchange 1 defines the normal mode and hand-over mode and realizes a communication link through a multi-pass connection to the migration machine 3 in hand-over mode, with reference to a communication link quality storage table, the connection gestalt to apply is chosen according to an individual according to the demand communication link quality of the communication link connection of an applicable migration machine. For example, to disappearance, on the connection of severe communication link quality, the multi-pass connection setting means 12 is operated so that a packet may be transmitted using a multi-pass connection including delay. Moreover, to delay, on the connection of severe communication link quality, the multi-pass connection setting means 12 is operated, or a communication link through the usual connection is continued on him so that a packet may be transmitted using the multi-pass connection who does not include delay.

[0045] As mentioned above, the communication link quality demanded of the connection enables it to offer the communication link quality which a connection demands also in the time of hand-over control with constituting an effective connection and the connection who has the possibility of packet disappearance although real time nature is strong to packet disappearance, so that it can choose.

[0046] Drawing 11 is the sequence diagram showing the packet ejection processing at the time of the hand-over control in a migration machine. In drawing 11 , 41 has a packet ejection means by which the packet ejection time interval from a buffer 41 can be adjusted freely, in the buffer (buffer means) which is formed in the migration machine 3 and accumulates the packet which received, and the migration machine 3.

[0047] Next, actuation is explained. After the migration machine 3 transmits a zone escape preliminary announcement message and shifts to hand-over mode, the packet to which the identification information received from the crossover exchange 1 was added is accumulated in the buffer 41 of the migration machine 3. The bigger value TL as an ejection time interval of the packet takeoff connection which takes out an are recording packet with the time interval specified as coincidence from the buffer 41 than the average packet receiving spacing T is set up, and a packet is transmitted at bigger spacing than the normal mode in the range permissible to an external device 40. Thus, although the receive packet is gradually accumulated in the buffer 41 if the migration machine 3 becomes hand-over mode, if the accumulated dose is supervised and a constant rate is exceeded, ejection spacing TL of a packet takeoff connection will be made small, if an accumulated dose decreases, it will take out, spacing TL is enlarged, it takes out in the range permissible to an external device 40, and spacing is adjusted. After the migration machine 3 transmits a zone fixing message and shifts to the normal mode, the value TS smaller than the average packet receiving spacing T as an ejection time interval of the packet takeoff connection which takes out an are recording packet from a buffer 41 is set up, and a packet is transmitted at spacing smaller than the normal mode in the range permissible to an external device 40. Then, when the packet accumulated in the buffer 41 is lost, the are recording to the buffer 41 of a receive packet is stopped, and the packet which received is transmitted to an external device 40.

[0048] As mentioned above, when the external device 40 which does not suit burst arrival of a packet was connected to the migration machine 3, or when performing the communication link with the high order processing means 16 which does not suit burst arrival of the packet in the migration machine 3, it becomes possible to ease the burst nature of the packet traffic accompanying hand-over control.

[0049] Moreover, the communication link quality table (the 2nd communication link quality storage means) which memorizes the communication link quality for every connection currently used for the migration machine 3 is prepared, and the actuation at the time of giving two or more packet takeoff connections which can adjust the packet ejection time interval from the buffer 41 which accumulates a receive packet, and a buffer 41 is explained. When the migration machine 3 becomes hand-over mode, a buffer 41 and a packet takeoff connection are assigned for every connection who does not suit burst nature with reference to a communication link quality table.

[0050] As mentioned above, it becomes possible to pass a packet to an external device 40 or the internal high order processing means 16 at intervals of the ejection according to individual

suitable for a connection.

[0051] Gestalt 3. drawing 12 of operation is the conceptual diagram showing a format of the zone escape preliminary announcement message by the gestalt 3 of implementation of this invention, and 50 is a zone escape preliminary announcement message of which the crossover exchange 1 is notified from the migration machine 3 in drawing. Drawing 13 is the conceptual diagram showing an example of a format of the base station positional information message by the gestalt 3 of implementation of this invention, and 51 is the base station positional information message of the ** area zone base station 2-1 concerned notified to the migration machine 3 from the ** area zone base station 2-1 in drawing. Drawing 14 is the conceptual diagram showing other examples of a format of the base station positional information message by the gestalt 3 of implementation of this invention, and the ** area zone base station 2-1 concerned where 52 is notified to the migration machine 3 from the ** area zone base station 2-1 and the circumference zone base station 2-2, the base station positional information message which consists of positional information of 2-3, and 53 are the detailed information of each base station information in drawing.

[0052] Next, actuation is explained. First, actuation is explained based on the zone escape preliminary announcement message shown in drawing 12. The migration machine 3 has the function which measures the receiving level of the electric wave from the ** area zone base station 2-1. Moreover, the frequency of the circumference zone base station 2-2 and the electric wave from 2-3 is notified from the ** area zone base station 2-1, and it has the function which measures the receiving level. This function is used and the possible circumference zone of migration is predicted according to the receiving level condition of the circumference zone measured by receiving level degradation of a ** area zone while judging zone escape (migration place zone prediction means). Then, when the migration machine 3 judges that the possibility of zone escape is high and notifies the crossover exchange 1 of the zone escape preliminary announcement message 50, based on the receiving level of the measured circumference zone, the crossover exchange 1 is notified of the number of the high circumference base station of possibility that one or more will move which the migration machine 3 judged as an information element of the zone escape preliminary announcement message 50. The crossover exchange 1 which received the zone escape preliminary announcement message 50 sets up a multi-pass connection to the notified circumference zone base station, and performs hand-over control.

[0053] As mentioned above, even if the crossover exchange 1 does not grasp the condition of each migration machine 3 in a detail, a setup of the multi-pass connection at the time of hand-over is simply attained by utilizing the function which the migration machine 3 has, judging the high circumference zone base station 2-2 of possibility that the migration machine 3 will serve as a subject and will move, and 2-3, and notifying the crossover exchange 1.

[0054] Next, actuation is explained based on the base station positional information message shown in drawing 13. A base station 2-1 to 2-3 and the migration machine 3 receive the signal of location gaging systems, such as GPS (Global Positioning System), and give the function to recognize positional information, such as one's LONG and LAT, (positional information receiving means). Effective zone distance information, such as an output of positional information, such as LONG of the ** area zone base station 2-1 and LAT, and the electric wave of those and a direction, is notified as a base station positional information message 51 to the migration machine 3 in a zone to timing periodic [a base station 2-1 to 2-3], or suitable (base station positional information message notification means). The migration machine 3 recognizes its location with the recognizing ability of its positional information, and judges the existence of possibility of escaping from a ** area zone, using such information while it receives the base station positional information message 51 from the ** area zone base station 2-1 and recognizes the location and effective zone of the ** area zone base station 2-1 (zone migration detection means).

[0055] As mentioned above, decision of zone escape which has endurance in turbulence of a temporary electric wave and the effect of an obstruction of the migration machine 3 is attained from the positional information of the ** area zone base station 2-1, and the positional

information of the migration machine 3 by judging the possibility of zone escape.

[0056] Furthermore, actuation is explained based on the base station positional information message shown in drawing 13. A base station 2-1 to 2-3 and the migration machine 3 receive the signal of a location gaging system, and have the function to recognize positional information, such as one's LONG and LAT, (positional information receiving means). Effective zone distance information, such as an output of positional information, such as LONG of each base station 2-1 to 2-3 and LAT, and the electric wave of those and a direction, is notified as a base station positional information message 51 to the migration machine 3 around the zone in a zone to timing periodic [a base station 2-1 to 2-3], or suitable (base station positional information message notification means). The idle time of the communication link with the ** area zone base station 2-1 is used for the migration machine 3. It has the function to receive the circumference zone base station 2-2 and the message from 2-3. While receiving the base station positional information message 51 from the circumference zone base station 2-2 and 2-3 and recognizing the circumference zone base station 2-2, the location of 2-3, and effective zone distance information Its location is recognized with the recognizing ability of its positional information, and the circumference zone where the migration machine 3 may move by such positional information is predicted (zone migration detection means). Next, when notifying the crossover exchange 1 of a zone escape preliminary announcement message, the crossover exchange 1 is notified of the number of the high circumference base station of possibility that one or more will move predicted in the migration machine 3 as an information element of the zone escape preliminary announcement message 50. The crossover exchange 1 which received the zone escape preliminary announcement message 50 sets up a multi-pass connection to the circumference zone base station which the migration machine 3 notified, and performs hand-over control.

[0057] As mentioned above, by predicting the circumference zone base station 2-2 and the circumference zone where the migration machine 3 may move from the positional information of 2-3, and the positional information of the migration machine 3 Even if prediction of the migration place zone which has endurance in turbulence of a temporary electric wave and the effect of an obstruction is attained and the crossover exchange 1 does not grasp the condition of each migration machine 3 in a detail A setup of the multi-pass connection at the time of hand-over is simply attained by utilizing the function which the migration machine 3 has, judging the high circumference zone base station of possibility that the migration machine 3 will serve as a subject and will move, and notifying the crossover exchange 1.

[0058] Next, actuation is explained based on the base station positional information message and base station information which were shown in drawing 14. A base station 2-1 to 2-3 and the migration machine 3 receive the signal of a location gaging system, and have the function to recognize positional information, such as one's LONG and LAT, (positional information receiving means). The ** area zone base station 2-1 notifies the base station information 53 which consists of effective zone distance information, such as an output of positional information, such as LONG of the free area zone base station 2-1, and LAT, and the electric wave of those, and a direction, to the circumference zone base station 2-2 and 2-3 to suitable timing as a base station positional information message 51, and recognizes the base station information of each other in between [base stations] 2-1-2-3. The ** area zone base station 2-1 notifies the base station positional information message 52 which has the base station information 53 on the ** area zone base station 2-1, one, and two or more circumference zone base station information 53 in the zone to the migration machine 3 which carries out a ** area (base station positional information message notification means). The migration machine 3 is put in block from the ** area zone base station 2-1, recognizes the ** area zone base station 2-1 and the circumference zone base station 2-2, and the base station information 53 on 2-3, and uses them for decision of the possibility of escape, and prediction of a migration place zone from a ** area zone (zone migration detection means).

[0059] As mentioned above, the migration machine 3 is put in block from the ** area zone base station 2-1, the ** area zone base station 2-1 and the circumference zone base station 2-2, and the base station information 53 on 2-3 can come to hand, and it becomes possible to simplify acquisition of the base station information 53. Moreover, even if it does not have a location

gaging system for measurement of positional information, such as LAT of a base station, and LONG, it is beforehand set as the base station, and the same effectiveness is acquired even if it notifies the base station information 53 including the positional information mutually.

[0060] Gestalt 4. drawing 15 of operation is the explanatory view showing the migration direction of the passage zone of the migration machine by the gestalt 4 of implementation of this invention, and the migration direction in a ** area zone, 60-1 and 60-2 are the base stations of the zone through which the migration machine 3 passed in drawing, and 61 is the passage zone migration direction which can be recognized from the passage zone of the migration machine 3. In a ** area zone, 3-1 is the location of the migration machine 3 in time of day T1, 3-2 is the location of the migration machine 3 in the subsequent time of day T2, and 62 is the migration direction in a ** area zone, and the migration direction which 63 predicted further. Drawing 16 is the explanatory view showing the passing speed of the passage zone of the migration machine by the gestalt 4 of implementation of this invention, and the passing speed in a ** area zone, and 65-1 and 65-2 are the passing speed of the passage zone through which the migration machine 3 passed in drawing. In a ** area zone, the migration machine 3 of passing speed [in / in 66 / a ** area zone], 2-4, and 2-5 is the 2nd step migration place zone base station where it may move at the 2nd following step which moved to the circumference zone.

[0061] Next, actuation is explained. First, based on drawing 15, prediction of a migration place base station is explained from migration. A base station 2-1 to 2-3 and the migration machine 3 receive the signal of a location gaging system, and have the function to recognize positional information, such as one's LONG and LAT, (the migration direction recognition means). From the base station 60-1 of the zone through which it passed until now, and 60-2, the passage zone base station 60-1 and the positional information of 60-2 are recognized, the positional information of the ** area zone base station 2-1 is also included by reception of the base station positional information message 52 etc., and the migration machine 3 recognizes the migration direction 61 of the passage zone of until by it (the migration direction recognition means). Moreover, by the location gaging system, its positional information is recognized periodically and the migration machine 3 recognizes the migration direction 62 in a ** area zone with the location 3-1 of the migration machine in time of day T1, and the location 3-2 of the migration machine in the subsequent time of day T2 (the migration direction recognition means). When the continuity of the migration direction 61 of the passage zone of the migration machine 3 and the migration direction 62 in a ** area zone is judged and continuity is accepted, the circumference zone base station 2-2 predicted according to the predicted migration direction 63 and 2-3 are limited, and as a predicted migration place base station, it adds to the zone escape preliminary announcement message 50, and notifies to the crossover exchange 1 (zone migration detection means).

[0062] As mentioned above, based on the migration place base station information predicted by the continuity of the migration direction, the destination base station of the multi-pass connection who sets up at the crossover exchange 1 can be limited, and the traffic by the multi-pass connection accompanying hand-over control can be reduced. This has high effectiveness, when moving in connection with vehicles which move with the directivity are continuously directive, such as an automobile which runs a train and a trunk road.

[0063] Next, based on drawing 16, prediction of a migration place base station is explained from passing speed. In addition to prediction of the migration direction shown by explanation of drawing 15 of operation, the migration machine 3 recognizes the passing speed 65-1 in the zone through which it passed until now, and 65-2. Moreover, by the location gaging system, its positional information is recognized periodically and the migration machine 3 recognizes the passing speed 66 in a ** area zone with the location 3-1 of the migration machine 3 in time of day T1, and the location 3-2 of the migration machine 3 in the subsequent time of day T2 (passing speed recognition means). When the continuity of the migration direction 61 of the passage zone of the migration machine 3 and the migration direction 62 in a ** area zone is judged and continuity is accepted, the circumference zone base station 2-2 predicted according to the predicted migration direction 63 and 2-3 are limited. Moreover, the continuity of the passing speed 65-1 of the passage zone of the migration machine 3 and the passing speed 66 in

65-2 and a ** area zone is judged, and after moving [the circumference zone base station 2-2 which continuity was accepted, and was predicted according to the migration direction when passing speed was high-speed, and] to 2-3, the migration place zone base station 2-4 where it may move after the 2nd step, and 2-5 are predicted. Thus, in the case of the migration machine 3 which is continuing high-speed migration, in addition to the circumference zone base station 2-2 predicted according to the migration direction, and 2-3, it adds to the zone escape preliminary announcement message 50 by making the migration place zone base station 2-4 after the 2nd step, and 2-5 into a migration place base station, and the crossover exchange 1 is notified of it (zone migration detection means).

[0064] As mentioned above, even if passing speed is high-speed, while limiting the destination base station of the multi-pass connection who sets up at the crossover exchange 1 based on the migration place base station information predicted by the continuity of the migration direction and rate and reducing traffic, the packet disappearance by hand-over frequent occurrence can be prevented. This has high effectiveness, when moving in connection with vehicles which carry out high-speed migration with the directivity are continuously directive, such as a high-speed automobile which runs the aircraft, a train, and a trunk road, or when a zone radius needs to perform hand-over frequently small.

[0065] Drawing 17 is the conceptual diagram showing a format of the migration information message by the gestalt 4 of implementation of this invention, and 70 is a migration machine information message which notifies the crossover exchange 1 of the migration direction and passing speed in a ** area zone from the migration machine 3 in drawing. Drawing 18 is the conceptual diagram showing a format of the zone escape preliminary announcement message by the gestalt 4 of implementation of this invention, and 71 is a zone escape preliminary announcement message of which adds the information about the migration direction and passing speed in a ** area zone, and the crossover exchange 1 is notified from the migration machine 3 in drawing.

[0066] Next, actuation is explained. A base station 2-1 to 2-3 and the migration machine 3 receive the signal of a location gaging system, and have the function to recognize positional information, such as one's LONG and LAT. With a location gaging system, its positional information is recognized periodically and the migration machine 3 notifies the crossover exchange 1 of the migration direction and passing speed as a migration machine information message 70 (migration machine information message transmitting means). [in / by the location 3-1 of the migration machine 3 in time of day T1, and the location 3-2 of the migration machine 3 in the subsequent time of day T2 / each ** area zone] The crossover exchange 1 which received this migration machine information message 70 memorizes the migration direction and passing speed in each passage zone of each migration machine 3. The migration machine 3 passes through the passage zone base station 60-2 and the zone of 60-1, and is in the zone of the ** area zone base station 2-1, when it is judged that possibility of escaping from a ** area zone is high, the zone escape preliminary announcement message 71 which added the information about the migration direction and passing speed in a ** area zone is generated, and the crossover exchange 1 is notified (zone escape preliminary announcement message notification means). The migration direction 61 of the passage zone which the crossover exchange 1 holds about the applicable migration machine 3 at the crossover exchange 1, and passing speed 65-1 and 65-2, With the migration direction 62 and passing speed 66 of a ** area zone which were notified by the zone escape preliminary announcement message 71 It judges that they are the continuity of the migration direction, the continuity of passing speed, and high-speed migration, and the circumference zone base station 2-2 which should set up a multi-pass connection as actuation of drawing 16 showed, 2-3 and the migration place zone base station 2-4 after the 2nd step, and 2-5 are determined.

[0067] As mentioned above, even if it constitutes so that the crossover exchange 1 may recognize the migration direction and passing speed of each migration machine 3, the same effectiveness as the configuration of drawing 16 is expectable.

[0068] Moreover, by the configuration which has both the functions of the crossover exchange 1 and a base station 2, although the gestalt of the above operation explained the configuration

which separated the function of the crossover exchange 1 and a base station 2 in the crossover exchange 1 and a base station 2, respectively, even if it constitutes a mobile communication network control unit, the same effectiveness is acquired.

[0069]

[Effect of the Invention] As mentioned above, according to this invention, the multi-pass connection from the crossover exchange to a circumference zone is set up, and a packet is delayed, it transmits, the packet disappearance by hand-over control is prevented, and the effectiveness which can continue the high communication link of quality is acquired.

[0070] According to this invention, at a migration machine and the crossover exchange, the normal mode and hand-over mode are defined for every migration machine, the possibility of hand-over sets up a multicast connection only to a high migration machine, and carries out flooding of the packet, the usual connection is set up to the migration machine in the condition of having been fixed to the zone, a packet is transmitted, and the effectiveness that the traffic volume in a mobile communication network can be reduced is acquired.

[0071] According to this invention, the effectiveness that the communication link quality which a connection demands also by the time of hand-over control by enabling it to choose an effective connection and the connection who has the possibility of packet disappearance although real time nature is strong to packet disappearance can be offered according to the communication link quality demanded of the connection is acquired.

[0072] According to this invention, when the external device which does not suit burst arrival of a packet was connected to the migration machine, or when performing the communication link with the high order processing means which does not suit burst arrival of the packet of the migration inside of a plane, the effectiveness which can ease the burst nature of the packet traffic accompanying hand-over control is acquired.

[0073] According to this invention, the effectiveness that a packet can be passed to the external device which does not suit burst nature, or an internal high order processing means at intervals of the ejection according to individual which was suitable for every connection is acquired.

[0074] The effectiveness which can perform a setup of the multi-pass connection at the time of hand-over simply is acquired by according to this invention, utilizing the function which a migration machine has, judging the high circumference zone base station of possibility that a migration machine will serve as a subject and will move, and notifying the crossover exchange, even if the crossover exchange does not grasp the condition of each migration machine in a detail.

[0075] According to this invention, when a migration machine judges the possibility of zone escape from the positional information of a ** area zone base station, and the positional information of a migration machine, the effectiveness which can perform decision of zone escape which has endurance in turbulence of a temporary electric wave and the effect of an obstruction is acquired.

[0076] According to this invention, the circumference zone where a migration machine may move from the positional information of a circumference zone base station and the positional information of a migration machine is predicted. Even if prediction of the migration place zone which has endurance in turbulence of a temporary electric wave and the effect of an obstruction is attained and the crossover exchange does not grasp the condition of each migration machine in a detail The effectiveness which can perform a setup of the multi-pass connection at the time of hand-over simply is acquired by utilizing the function which a migration machine has, judging the high circumference zone base station of possibility that a migration machine will serve as a subject and will move, and notifying the crossover exchange.

[0077] According to this invention, a migration machine is put in block from a ** area zone base station, the base station information on a ** area zone base station and a circumference zone base station can come to hand, and the effectiveness which can simplify acquisition of base station information is acquired.

[0078] According to this invention, based on the migration place base station information predicted by the continuity of the migration direction, the destination base station of the multi-pass connection who sets up at the crossover exchange is limited, and the effectiveness which

can reduce the traffic by the multi-pass connection accompanying hand-over control is acquired. This has high effectiveness, when moving in connection with vehicles which move with the directivity are continuously directive, such as an automobile which runs a train and a trunk road.

[0079] Even if passing speed is high-speed, while according to this invention limiting the destination base station of the multi-pass connection who sets up at the crossover exchange based on the migration place base station information predicted by the continuity of that migration direction and rate and reducing traffic, the effectiveness that the packet disappearance by hand-over frequent occurrence can be prevented is acquired. This has high effectiveness, when moving in connection with vehicles which carry out high-speed migration with the directivity are continuously directive, such as a high-speed automobile which runs the aircraft, a train, and a trunk road, or when a zone radius needs to perform hand-over frequently small.

[0080] While according to this invention the crossover exchange recognizes the migration direction and passing speed of each migration machine and reduces traffic, the effectiveness that the packet disappearance by hand-over frequent occurrence can be prevented is acquired. This has high effectiveness, when moving in connection with vehicles which carry out high-speed migration with the directivity are continuously directive, such as a high-speed automobile which runs the aircraft, a train, and a trunk road, or when a zone radius needs to perform hand-over frequently small.

[0081] While according to this invention the round variable of a modulo suitable as identification information is used and the duplication packet in a migration machine can be detected, there is effectiveness utilizable for detection of a disappearance packet and the resending control between the crossover exchange and a migration machine.

[0082] While according to this invention the time information of a precision suitable as identification information is used and the duplication packet in a migration machine can be detected, there is effectiveness which is utilized for the fluctuation amendment processing at the time of packet playback and which can carry out things.

[0083] According to this invention, it has the 1st packet branching means and the 2nd packet branching means, and there is effectiveness which can constitute the memory space of a packet delay buffer means which realizes a packet delay means few.

[0084] According to this invention, even if it constitutes the configuration which combines the function realized at the crossover exchange, and the function realized in a base station etc. as a mobile communication network control unit, said effectiveness and the same effectiveness are acquired.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the mobile communication network control unit in the case of transmitting the information on voice, data, etc. as fixed-length or variable-length a packet and an ATM cel with the header information of a fixed form in the mobile communication network which consists of the crossover exchange which sets up the suitable communication path of the switched network which reaches the migration machine in a fixed zone, the base station which performs control and a communication link of that migration machine via a wireless circuit, and the optimal base station for migration machines.

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PRIOR ART

[Description of the Prior Art] Drawing 19 is the block block diagram showing the conventional mobile communication network control device shown in JP,5-91555,A, and he is the crossover exchange where the base station in which 100-1 to 100-3 forms a wireless zone in, and 101-1 to 101-3 forms the wireless zone 100-1 to 100-3, and 103 control a migration machine, and 104 controls a base station 101-1 to 101-3 in drawing. Here, the migration machine 103 communicates, switching a base station 101-1 to 101-3, and a communication channel.

[0003] Next, actuation is explained. While the migration machine 103 communicates with the ** area zone base station 101-1, when moving, the communication channel of the circumference zone base station 101-2,101-3 is reserved. Moreover, when detection of communication link quality degradation of the ** area zone base station 101-1 performs a channel switch, a channel switch is performed to the channel by which the circumference zone base station 101-2 or 101-3 was reserved.

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EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, according to this invention, the multi-pass connection from the crossover exchange to a circumference zone is set up, and a packet is delayed, it transmits, the packet disappearance by hand-over control is prevented, and the effectiveness which can continue the high communication link of quality is acquired.

[0070] According to this invention, at a migration machine and the crossover exchange, the normal mode and hand-over mode are defined for every migration machine, the possibility of hand-over sets up a multicast connection only to a high migration machine, and carries out flooding of the packet, the usual connection is set up to the migration machine in the condition of having been fixed to the zone, a packet is transmitted, and the effectiveness that the traffic volume in a mobile communication network can be reduced is acquired.

[0071] According to this invention, the effectiveness that the communication link quality which a connection demands also by the time of hand-over control by enabling it to choose an effective connection and the connection who has the possibility of packet disappearance although real time nature is strong to packet disappearance can be offered according to the communication link quality demanded of the connection is acquired.

[0072] According to this invention, when the external device which does not suit burst arrival of a packet was connected to the migration machine, or when performing the communication link with the high order processing means which does not suit burst arrival of the packet of the migration inside of a plane, the effectiveness which can ease the burst nature of the packet traffic accompanying hand-over control is acquired.

[0073] According to this invention, the effectiveness that a packet can be passed to the external device which does not suit burst nature, or an internal high order processing means at intervals of the ejection according to individual which was suitable for every connection is acquired.

[0074] The effectiveness which can perform a setup of the multi-pass connection at the time of hand-over simply is acquired by according to this invention, utilizing the function which a migration machine has, judging the high circumference zone base station of possibility that a migration machine will serve as a subject and will move, and notifying the crossover exchange, even if the crossover exchange does not grasp the condition of each migration machine in a detail.

[0075] According to this invention, when a migration machine judges the possibility of zone escape from the positional information of a ** area zone base station, and the positional information of a migration machine, the effectiveness which can perform decision of zone escape which has endurance in turbulence of a temporary electric wave and the effect of an obstruction is acquired.

[0076] According to this invention, the circumference zone where a migration machine may move from the positional information of a circumference zone base station and the positional information of a migration machine is predicted. Even if prediction of the migration place zone which has endurance in turbulence of a temporary electric wave and the effect of an obstruction is attained and the crossover exchange does not grasp the condition of each migration machine in a detail The effectiveness which can perform a setup of the multi-pass connection at the time of hand-over simply is acquired by utilizing the function which a migration machine has, judging

the high circumference zone base station of possibility that a migration machine will serve as a subject and will move, and notifying the crossover exchange.

[0077] According to this invention, a migration machine is put in block from a ** area zone base station, the base station information on a ** area zone base station and a circumference zone base station can come to hand, and the effectiveness which can simplify acquisition of base station information is acquired.

[0078] According to this invention, based on the migration place base station information predicted by the continuity of the migration direction, the destination base station of the multi-pass connection who sets up at the crossover exchange is limited, and the effectiveness which can reduce the traffic by the multi-pass connection accompanying hand-over control is acquired. This has high effectiveness, when moving in connection with vehicles which move with the directivity are continuously directive, such as an automobile which runs a train and a trunk road.

[0079] Even if passing speed is high-speed, while according to this invention limiting the destination base station of the multi-pass connection who sets up at the crossover exchange based on the migration place base station information predicted by the continuity of that migration direction and rate and reducing traffic, the effectiveness that the packet disappearance by hand-over frequent occurrence can be prevented is acquired. This has high effectiveness, when moving in connection with vehicles which carry out high-speed migration with the directivity are continuously directive, such as a high-speed automobile which runs the aircraft, a train, and a trunk road, or when a zone radius needs to perform hand-over frequently small.

[0080] While according to this invention the crossover exchange recognizes the migration direction and passing speed of each migration machine and reduces traffic, the effectiveness that the packet disappearance by hand-over frequent occurrence can be prevented is acquired. This has high effectiveness, when moving in connection with vehicles which carry out high-speed migration with the directivity are continuously directive, such as a high-speed automobile which runs the aircraft, a train, and a trunk road, or when a zone radius needs to perform hand-over frequently small.

[0081] While according to this invention the round variable of a modulo suitable as identification information is used and the duplication packet in a migration machine can be detected, there is effectiveness utilizable for detection of a disappearance packet and the resending control between the crossover exchange and a migration machine.

[0082] While according to this invention the time information of a precision suitable as identification information is used and the duplication packet in a migration machine can be detected, there is effectiveness which is utilized for the fluctuation amendment processing at the time of packet playback and which can carry out things.

[0083] According to this invention, it has the 1st packet branching means and the 2nd packet branching means, and there is effectiveness which can constitute the memory space of a packet delay buffer means which realizes a packet delay means few.

[0084] According to this invention, even if it constitutes the configuration which combines the function realized at the crossover exchange, and the function realized in a base station etc. as a mobile communication network control unit, said effectiveness and the same effectiveness are acquired.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since the conventional mobile communication network control unit was constituted as mentioned above, it had the technical problem that communication link information disappeared with the migration place zone base station 101-2 or switch processing of the connection of 101-3 from the ** area zone base station 101-1. Increase of the amount of information which suffers a loss according to disappearance of a packet or an ATM cel when transmitting the information on voice or data to a high speed in a format like a packet or an ATM cel especially was remarkable, and when the migration machine 103 moved to a high speed, or when a zone region was set up small, technical problems, such as becoming the factor which switch processings occur [factor] frequently and degrades communication link quality greatly, occurred.

[0005] It was made in order that this invention might solve the above technical problems, and it aims at obtaining the mobile communication network control unit which prevents disappearance of the communication link information accompanying a switch of the communication path from the crossover exchange to a base station in a high-speed communication link, high-speed migration, and the switch control in the narrow mobile communication network of a zone field.

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MEANS

[Means for Solving the Problem] The mobile communication network control device concerning this invention to the crossover exchange A multi-pass connection setting means to set up the multi-pass connection of addressing to the migration machine via a circumference zone base station which addressing to the migration machine via a ** area zone base station and a migration machine may move, An identification information addition means to add to a packet the identification information which shows that the packet by which flooding is carried out to the multi-pass connection is the same, Except for the ** area zone base station course of a migration machine, it has a packet delay means to delay the packet which transmits the multi-pass connection top via a circumference zone base station. A migration machine is equipped with a receiving sequence control means to discard a duplication receive packet, with reference to the identification information of the packet received from a ** area zone base station and a circumference zone base station.

[0007] The mobile communication network control device concerning this invention in a migration machine and the crossover exchange It has the normal mode in the condition that the migration machine is fixed to the ** area zone, and the hand-over mode of the condition that possibility that a migration machine will escape from a ** area zone, and hand-over will occur is high. A migration machine A zone migration detection means to detect whether possibility that a migration machine will escape from a ** area zone is high, When it is judged that possibility that detection by the zone migration detection means will escape from a ** area zone at the time of the normal mode is in a high condition, while transmitting a zone escape preliminary announcement message to the crossover exchange The zone escape preliminary announcement message notification means which makes a migration machine hand-over mode, When it is judged that it is in the condition to which detection by the zone migration detection means was fixed to the ** area zone at the time of hand-over mode, while transmitting a zone fixing message to the crossover exchange It has the zone fixing message notification means which makes a migration machine the normal mode. The crossover exchange According to reception of a zone escape preliminary announcement message and a zone fixing message, hand-over mode or the normal mode is recognized. At the time of hand-over mode with a multi-pass connection setting means While setting up the multi-pass connection of addressing to the migration machine via a ** area zone base station, and addressing to the migration machine via a circumference zone base station With an identification information addition means, the packet by which flooding is carried out to a multi-pass connection adds the identification information which shows the same thing to a packet. With a packet delay means Except for the ** area zone base station course of a migration machine, the packet which transmits the multi-pass connection top via a circumference zone base station is delayed. At the time of the normal mode with a multi-pass connection setting means While setting up the connection only addressed to the migration machine via a ** area zone base station, addition to the packet of the identification information by the identification information addition means is stopped.

[0008] The mobile communication network control device concerning this invention to the crossover exchange [whether it is severely required from packet disappearance for every addressing connection to a migration machine, and] It has a 1st communication link quality

storage means by which the communication link quality of whether to be severely required from packet delay was memorized. The communication link quality demanded of the connection at the time of hand-over mode receives packet disappearance. When severe, with a packet delay means The packet which transmits the multi-pass connection top via a circumference zone base station is delayed, and to packet delay, the communication link quality demanded of the connection stops delay of the packet by the packet delay means, when severe.

[0009] The mobile communication network control device concerning this invention is equipped with the packet ejection means which can be freely adjusted to arbitration for the ejection time interval of the packet accumulated in a buffer means to accumulate the received packet in a migration machine, and its buffer means.

[0010] The mobile communication network control device concerning this invention has a 2nd communication link quality storage means by which the communication link quality of whether to connect a buffer means and a packet ejection means to a migration machine for every connection was memorized, and a buffer means and a packet ejection means are connected based on the 2nd communication link quality storage means for every connection.

[0011] The mobile communication network control unit concerning this invention measures the signal state received from a ** area zone base station and a circumference zone base station to a migration machine. It has a migration place zone prediction means to predict a migration place zone. A zone escape preliminary announcement message notification means The migration place zone predicted by the migration place zone prediction means is added to a zone escape preliminary announcement message, and it transmits to the crossover exchange. The crossover exchange The circumference zone which should set up a multi-pass connection according to the migration place zone in the received zone escape preliminary announcement message is determined.

[0012] The mobile communication network control unit concerning this invention equips a migration machine and a base station with a positional information receiving means to receive the positional information of the migration machine by location gaging systems, such as GPS, and a base station. A base station is equipped with a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of a base station to the migration machine in the zone of a base station, based on the received positional information. The zone migration detection means of a migration machine judges the existence of possibility of escaping from a ** area zone according to the positional information of the migration machine received from the positional information and the effective zone distance, and the location gaging system of a base station of the received base station positional information message.

[0013] The mobile communication network control unit concerning this invention equips a migration machine and a base station with a positional information receiving means to receive the positional information of the migration machine by location gaging systems, such as GPS, and a base station. A base station is equipped with a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of a base station to the migration machine of a ** area zone and a circumference zone, based on the received positional information. When the zone migration detection means of a migration machine had high possibility that a migration machine will escape from a ** area zone and it detects A migration place zone is predicted according to the positional information of the migration machine received from the positional information and the effective zone distance, and the location gaging system of a base station of the received base station positional information message. The predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0014] The mobile communication network control unit concerning this invention a migration machine and a base station It has a positional information receiving means to receive the positional information of the migration machine by location gaging systems, such as GPS, and a base station. Each base station While notifying the base station positional information message which shows the positional information and effective zone distance of a base station to a

circumference zone base station based on the received positional information. It has a base station positional information message notification means to notify the base station positional information message which shows the positional information and effective zone distance of a base station and a circumference zone base station to the migration machine of a ** area zone. When the zone migration detection means of a migration machine had high possibility that a migration machine will escape from a ** area zone and it detects. A migration place zone is predicted according to the positional information of the migration machine received from the positional information and the effective zone distance, and the location gaging system of the base station of the received base station positional information message, and a circumference zone base station. The predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0015] The migration direction of a migration machine [in / based on the positional information of the base station of the zone which passed the mobile communication network control device concerning this invention to the migration machine until now according to the received base station positional information message / a ** area zone], It has a migration direction recognition means to recognize the migration direction of a migration machine based on the positional information of the migration machine by location gaging systems, such as GPS, from continuity with the migration direction of the migration machine in a ** area zone. When the zone migration detection means of a migration machine had high possibility that a migration machine will escape from a ** area zone and it detects. A migration place zone is predicted according to the migration direction of the migration machine recognized by the migration direction recognition means, and the predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0016] The passing speed of a migration machine [in / based on the positional information of the base station of the zone which passed the mobile communication network control device concerning this invention to the migration machine until now according to the received base station positional information message / a ** area zone], It has a passing speed recognition means to recognize the passing speed of a migration machine based on the positional information of the migration machine by location gaging systems, such as GPS, from continuity with the passing speed of the migration machine in a ** area zone. The zone migration detection means of a migration machine has high possibility that a migration machine will escape from a ** area zone. And when it is judged that the passing speed recognized by the passing speed recognition means is high. The migration place zone which adjoins a migration place zone by migration of the migration place zone which adjoins a ** area zone according to the migration direction of the migration machine recognized by the migration direction recognition means, and after that is predicted. The predicted migration place zone is added to a zone escape preliminary announcement message, and it transmits to it at the crossover exchange.

[0017] While the mobile communication network control unit concerning this invention recognizes the migration direction and passing speed of a migration machine in a ** area zone to a migration machine based on the positional information of the migration machine by location gaging systems, such as GPS. A migration machine information message transmitting means to transmit to the crossover exchange by making the migration direction and passing speed of a migration machine into a migration machine information message. When possibility that a migration machine will escape from a ** area zone was high and it detects, it has a zone escape preliminary announcement message notification means to transmit to the crossover exchange as a zone escape preliminary announcement message which added the migration direction and passing speed of a migration machine in a ** area zone. The crossover exchange. The migration direction and passing speed of the migration machine according to the received migration machine information message, And it is based on the migration direction and passing speed of the migration machine according to the received zone escape preliminary announcement message. When it judges whether the migration direction and the continuity of passing speed, and its passing speed are high and it is judged that passing speed is high. The migration place zone which adjoins a migration place zone by migration of the migration place zone which adjoins a ** area zone according to the migration direction of a migration machine, and after that is predicted, and

the circumference zone which should set up a multi-pass connection according to these migration place zone is determined.

[0018] In case the mobile communication network control device concerning this invention has the counter means of sufficient modulo which generates identification information and carries out the copy transfer of the packet in each multi-pass connection from the crossover exchange, it is counted up for it while it adds the value of a counter means to an identification information addition means as identification information, and uses the sequence number for it as an identification number.

[0019] In case the mobile communication network control device concerning this invention has the clock means of a precision required for the crossover exchange which generates identification information and carries out the copy transfer of the packet in each multi-pass connection from the crossover exchange, it adds the time information of a clock means to an identification information addition means as identification information, and uses time information for it as an identification number.

[0020] The mobile communication network control device concerning this invention a multi-pass connection setting means It branches on the connection addressed to the migration machine via a ** area zone base station, and two connections of the connection of addressing to the migration machine via a circumference zone base station which a migration machine may move. It has a 1st packet branching means to copy a packet and to transmit to these two connections. A packet delay means It has a packet delay buffer means to realize packet delay, about the connection addressed to the migration machine via a circumference zone base station. A multi-pass connection setting means has the 2nd packet branching means which copies the packet delayed according to the plurality, when there are two or more circumference zone base stations where a migration machine may move further.

[0021] The equipment having the function of a base station and the crossover exchange is used for the mobile communication network control device concerning this invention as a base station and the crossover exchange.

[0022]

[Embodiment of the Invention] Hereafter, one gestalt of implementation of this invention is explained.

Gestalt 1. drawing 1 of operation is the block block diagram showing the mobile communication network control device by the gestalt 1 of implementation of this invention, and is set to drawing. The crossover exchange which sets up a communication path with the mobile switched network suitable for 1 which reaches the base station for migration machines, 2 is a base station which performs control and a communication link of a migration machine via the migration machine and wireless circuit in a fixed zone, among those, as for a ** area zone base station while a migration machine is communicating, 2-2, and 2-3, the migration machine of 2-1 is the circumference zone base station where it may move. 3 is a migration machine which continues a communication link by hand-over control (switch control), when moving in a mobile communication network between zones.

[0023] An identification information addition means add the identification information for recognizing that the interface between the exchanges with which 10 makes connection with other exchanges, and 11 have the same packet by which flooding is carried out to a multi-pass connection at the crossover exchange 1 to a packet, a multi-pass connection setting means control a setup of the connection who does flooding of 12, and 13 are a packet delay means transmit to the path addressed to a base station, after carrying out a fixed time-amount hold only of a required connection's packet. Moreover, in the migration machine 3, a receiving sequence control means to prepare the sequence of a receive packet with reference to the identification information by which 15 was added to the receive packet, and 16 are high order processing means to perform processing, transmitting and receiving data.

[0024] Drawing 2 is a sequence when it is the sequence diagram showing actuation of the mobile communication network control unit by the gestalt 1 of implementation of this invention, the migration machine 3 moves in a zone in the mobile communication network control unit by drawing 1 R> 1 and hand-over control is performed. Drawing 3 is the block block diagram

showing an example of the identification information addition means of the crossover exchange, and the packet buffer in which 20 stores packet information, and 21 are counter means to generate identification information, in drawing. Drawing 4 R> 4 is the block block diagram showing other examples of the identification information addition means of the crossover exchange, and 22 is a clock means with sufficient precision to identify the packet processed sequentially in drawing.

[0025] Drawing 5 is the block block diagram showing an example of the multi-pass connection setting means of the crossover exchange, and a packet delay means, and is set to drawing. The multi-pass connection setting control means by which 25 controls a setup of the multi-pass connection to the addressing connection to ** area zone base station 2-1 and the circumference zone base station 2-2, and the addressing connection to 2-3, A packet delay buffer means by which 26 delays the packet of the circumference zone base station 2-2 and the addressing connection to 2-3, 27 each base station 2 A transmitting processing means to transmit a packet for turning, a 1st packet branching means by which 28 branches the addressing connection to ** area zone base station 2-1, and the circumference zone base station 2-2 and the addressing connection to 2-3, 29 is a 2nd packet branching means to branch two or more circumference zone base stations 2-2 and the addressing connection to 2-3.

[0026] Next, actuation is explained. First, in drawing 1 , actuation of a mobile communication network control unit is explained. Drawing 1 is in the condition which is communicating by locating the migration machine 3 in the zone which the ** area zone base station 2-1 serves, and the crossover exchange 1 which manages the migration machine 3 receives the packet addressed to migration machine 3 through the interface 10 between the exchanges from the adjoining exchange. Then, the identification information for recognizing that the packet by which flooding is carried out to a multi-pass connection is the same is added with the identification information addition means 11, and a packet is copied for each [which was set up by the multi-pass connection setting means 12] connection of every. The packet of the addressing connection to ** area zone base station 2-1 in which the migration machine 3 is located is transmitted immediately. Moreover, the packet of the circumference zone base station 2-2 where the migration machine 3 may move, and the addressing connection to 2-3 accumulates only the time amount specified as the packet delay means 13, and is transmitted after that through each circumference zone base station 2-2 and the addressing connection to 2-3. And the ** area zone base station 2-1 and the circumference zone base station 2-2, and 2-3 transmit the packet transmitted from the crossover exchange 1 to migration machine 3 through a wireless circuit. The migration machine 3 is passed to the high order processing means 16 of the migration machine 3 interior, after receiving the packet, having recognized the identification information of a receive packet in the receiving sequence control means 15, detecting the duplication reception and packet disappearance which are generated at the time of the hand-over of this method and controlling a packet as sequence.

[0027] In drawing 2 , the migration machine 3 explains the packet sequence in the hand-over control which carries out zone migration from the zone of the ** area zone base station 2-1 in the circumference zone base station 2-2 in a mobile communication network. When the migration machine 3 is in the zone of the ** area zone base station 2-1, it is transmitted from the packet (1) crossover exchange 1 through the connection addressed to ** area zone base station 2-1 (one of the multi-pass connections), and through the radio channel which the migration machine 3 is using from the ** area zone base station 2-1, it is transmitted to the migration machine 3 and received. The crossover exchange 1 suspends a packet (1) for coincidence with the packet delay means 13 temporarily, and a packet (1) is discarded, when it is transmitted to each circumference zone base station 2-2 and 2-3 through the connection (one or more of a multi-pass connection) of the circumference zone base station 2-2 where the migration machine 3 may move after that, and addressing to 2-3 and there is no radio channel to the migration machine 3 in the base station. When it sets to the base station and the radio channel to the migration machine 3 is established or reserved, it is transmitted to the migration machine 3 through the radio channel which the migration machine 3 is using. The packet (2) to continue is similarly received by the migration machine 3 by ** area zone base station 2-1 course.

[0028] Then, the migration machine 3 interrupts the communication link with the ** area zone base station 2-1 for the reasons of communication link quality degradation etc., and starts the hand-over control changed to a communication channel with the good circumference zone base station 2-2 of communication link quality. In the meantime, release of a radio channel with the ** area zone base station 2-1, a setup of a radio channel with the circumference zone base station 2-2, information interchange between the migration machine 3 and the crossover exchange 1, etc. need to perform hand-over control, and the condition that packet communication is impossible generates them between the time amount which performs the processing. Although a packet (3) is transmitted from the crossover exchange 1 through the connection addressed to ** area zone base station 2-1 (one of the multi-pass connections) and it is transmitted by the radio channel which the migration machine 3 is using from the ** area zone base station 2-1 after hand-over control is started in the migration machine 3, since the migration machine 3 is contained in hand-over control, it will not be received but will disappear. Although future packets (4) and (5) are transmitted to the migration machine 3 by ** area zone base station 2-1 course, it will not be received but will disappear. The receive packet between hand-over control was conventionally recovered in this way using the high order layer protocol which will not be disappeared and offered. However, when the migration machine 3 moves to a high speed, hand-over control comes to occur frequently, and in connection with transmission speed becoming a high speed at coincidence, the number of packets which disappears increases and becomes the big cause of communication link quality degradation.

[0029] After the same packet as packet (1) - (5) transmitted to the migration machine 3 by the two to ** area zone base station 1 course passes through the fixed time delay by the packet delay means 13, it constitutes from a gestalt 1 of this operation so that it may be transmitted by the multi-pass connection from the crossover exchange 1 to the circumference zone base station 2-2 and 2-3. The migration machine 3 ends said hand-over control, sets up a communication channel with the migration place zone base station (circumference zone base station in front of hand-over) 2-2, and starts a communication link. Then, by migration place zone base station 2-2 course, the packet (2) delayed with the packet delay means 13 of the crossover exchange 1 is transmitted to the migration machine 3, and is received. The migration machine 3 recognizes that it is a packet [finishing / reception] from the ** area zone base station 2-1 with reference to the identification information of a receive packet with the receiving sequence control means 15, and discards it as a duplication packet. Next, by migration place zone base station 2-2 course, packet (3) - (5) delayed with the packet delay means 13 of the crossover exchange 1 is transmitted to the migration machine 3, and is received. The migration machine 3 recognizes that it is the packet continued with reference to the identification information of a receive packet with the receiving sequence control means 15 to a packet [finishing / reception in the ** area zone 2-1], and passes it to the high order processing means 16.

[0030] As mentioned above, by setting up the multi-pass connection from the crossover exchange 1 to a circumference zone, delaying a packet, and transmitting, the packet disappearance by hand-over control is prevented, and the high communication link of quality can be continued.

[0031] Next, the identification information addition means 11 shown in drawing 3 is explained. The crossover exchange 1 has the counter means 21 of suitable magnitude as a generation means of the identification information added to a packet. When the addressing packet to migration machine 3 is received, a receive packet is stored in a packet buffer 20, the counter value by the counter means 21 is written in this suitable identification information field, and that counter means 21 is counted up. The packet to which this identification information was added is copied to each addressing to a base station by the multi-pass connection, and is transmitted.

[0032] As mentioned above, it is also possible to utilize for detection of a disappearance packet and the resending control between the crossover exchange 1 and the migration machine 3 at the same time the duplication packet in the migration machine 3 is detectable by using the round variable of a modulo suitable as identification information.

[0033] Next, the identification information addition means 11 shown in drawing 4 is explained.

The crossover exchange 1 has the clock means 22 of sufficient precision for the packet which the crossover exchange 1 receives to be uniquely discriminable as a generation means of the identification information added to a packet. When the addressing packet to migration machine 3 is received, a receive packet is stored in a packet buffer 20, and the time information by the clock means 22 is written in this suitable identification information field. The packet to which this identification information was added is copied to each addressing to a base station by the multi-pass connection, and is transmitted.

[0034] As mentioned above, it is possible to utilize for the fluctuation amendment processing at the time of packet playback at the same time the duplication packet in the migration machine 3 is detectable by using the time information of a precision suitable as identification information.

[0035] Next, the multi-pass connection setting means 12 and the packet delay means 13 which were shown in drawing 5 are explained. In order that the crossover exchange 1 may branch the packet addressed to migration machine 3 for two connections, the connection who transmits by two to ** area zone base station 1 course, and the connection who transmits by one or more circumference zone base stations 2-2 and 2-3 course, a packet is copied with the 1st bucket branching means 28. The packet for the connections who transmit by two to ** area zone base station 1 course is immediately transmitted from the transmitting processing means 27. The circumference zone base station 2-2 and the packet for the connections who transmit by 2-3 course were specified as a packet delay buffer means 26 to realize the packet delay means 13, and time amount are recording is carried out. Then, it is taken out from the packet delay buffer means 26, and in order to branch a packet according to the circumference zone base station 2-2 which should be transmitted, and the number of 2-3 for the circumference zone base station 2-2 and the connections for 2 to 3 minutes, a packet is copied with the 2nd packet branching means 29. The copied each packet is transmitted to each destination circumference zone base station 2-2 and 2-3 from the transmitting processing means 27. With the 1st packet branching means 28, whether it turns 2-3 and a connection is branched manages [the circumference zone base station 2-2, whether it turns 2-3 and a connection is branched, which circumference zone base station 2-2, and] in the multi-pass connection setting control means 25, and it directs branching control for the 1st packet branching means 28 and the 2nd packet branching means 29.

[0036] Thus, the memory space of the packet delay buffer means 26 which realizes the packet delay means 13 can be constituted few by having the 1st packet branching means 28 and the 2nd packet branching means 29.

[0037] The flow Fig. of operation at the time of the normal mode in the migration machine of the mobile communication network control unit according [gestalt 2. drawing 6 of operation] to the gestalt 2 of implementation of this invention, the flow Fig. of operation at the time of hand-over mode [in / in drawing 7 / a migration machine], the flow Fig. of operation at the time of the normal mode [in / in drawing 8 / the crossover exchange], and drawing 9 are the flow Figs. of operation at the time of the hand-over mode of the crossover exchange.

[0038] Next, actuation is explained. It has the normal mode fixed to a ** area zone — the migration machine 3 is standing it still in a zone, or is moving in the zone center section at a low speed — and the high hand-over mode of possibility that moving in the border area of a zone etc. will escape from a ** area zone, and hand-over will occur, as an internal state, and possibility of escaping from a ** area zone has a zone migration detection means to recognize a high thing. Next, drawing 6 explains actuation in case the migration machine 3 is the normal mode. When the possibility of ** area zone escape is judged with a zone migration detection means when the migration machine 3 is in the normal mode (step ST 1), and it is judged that the possibility of escape is high, the crossover exchange 1 is notified of a zone escape preliminary announcement message by two to ** area zone base station 1 course (a step ST 2, zone escape preliminary announcement message notification means). After judging that the possibility of escape is not high, or after transmitting a zone escape message, it judges [whether the identification information of a receive packet is significant, and] whether (step ST3) and the crossover exchange 1 recognize it as hand-over mode depending on whether it is non-mind. When the crossover exchange 1 recognizes it as identification information being significant and it being in hand-over mode about the applicable migration machine 3, the mode of the migration

machine 3 is shifted to hand-over mode (step ST 4). When identification information is non-mind, it stops at the normal mode as it is. When stopping at the normal mode, the method of preventing frequent occurrence of a zone escape preliminary announcement message notification (step ST 2) is also effective.

[0039] Next, drawing 7 explains actuation in case the migration machine 3 is in hand-over mode. When ** area zone escape possibility was judged (step ST 11), and there is no possibility of escape and it is judged as fixing with a zone migration detection means, the crossover exchange 1 is notified of a zone fixing message by two to ** area zone base station 1 course.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the block block diagram showing the mobile communication network control device by the gestalt 1 of implementation of this invention.

[Drawing 2] It is the sequence diagram showing actuation of the mobile communication network control unit by the gestalt 1 of implementation of this invention.

[Drawing 3] It is the block block diagram showing an example of the identification information addition means of the crossover exchange.

[Drawing 4] It is the block block diagram showing other examples of the identification information addition means of the crossover exchange.

[Drawing 5] It is the block block diagram showing an example of the multi-pass connection setting means of the crossover exchange, and a packet delay means.

[Drawing 6] It is a flow Fig. of operation at the time of the normal mode in the migration machine of the mobile communication network control unit by the gestalt 2 of implementation of this invention.

[Drawing 7] It is a flow Fig. of operation at the time of the hand-over mode in a migration machine.

[Drawing 8] It is a flow Fig. of operation at the time of the normal mode in the crossover exchange.

[Drawing 9] It is a flow Fig. of operation at the time of the hand-over mode of the crossover exchange.

[Drawing 10] It is the conceptual diagram showing the communication link quality storage table in the crossover exchange.

[Drawing 11] It is the sequence diagram showing the packet ejection processing at the time of the hand-over control in a migration machine.

[Drawing 12] It is the conceptual diagram showing a format of the zone escape preliminary announcement message by the gestalt 3 of implementation of this invention.

[Drawing 13] It is the conceptual diagram showing an example of a format of the base station positional information message by the gestalt 3 of implementation of this invention.

[Drawing 14] It is the conceptual diagram showing other examples of a format of the base station positional information message by the gestalt 3 of implementation of this invention.

[Drawing 15] It is the explanatory view showing the migration direction of the passage zone of the migration machine by the gestalt 4 of implementation of this invention, and the migration direction in a ** area zone.

[Drawing 16] It is the explanatory view showing the passing speed of the passage zone of the migration machine by the gestalt 4 of implementation of this invention, and the passing speed in a ** area zone.

[Drawing 17] It is the conceptual diagram showing a format of the migration information message by the gestalt 4 of implementation of this invention.

[Drawing 18] It is the conceptual diagram showing a format of the zone escape preliminary announcement message by the gestalt 4 of implementation of this invention.

[Drawing 19] It is the block block diagram showing the conventional mobile communication

network control device.

[Description of Notations]

1 Crossover Exchange, 2-1 ** Area Zone Base Station, 2-2, 2-3 Circumference Zone Base Station, 3 A migration machine, 11 An identification information addition means, 12 Multi-pass connection setting means, 13 A packet delay means, 15 A receiving sequence control means, 21 counter means, 22 A clock means, 26 A packet delay buffer means, 28 The 1st packet branching means, 29 The 2nd packet branching means, 41 50 A buffer (buffer means), 71 51 A zone escape preliminary announcement message, 52 A base station positional information message, ST2 A zone escape preliminary announcement message notification means, ST12 Zone fixing message notification means.

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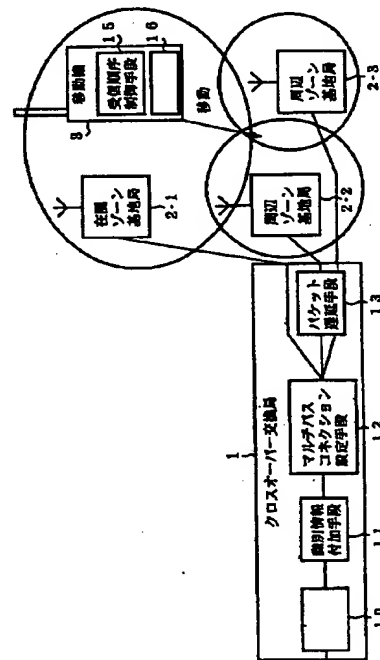
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(54) 【発明の名称】 移動体通信網制御装置

(57) 【要約】

【課題】 在圏ゾーン基地局から移動先ゾーン基地局へのコネクションの切り換え処理に伴ない、通信情報が消失する。

【解決手段】 クロスオーバー交換局1に、マルチバスコネクションを設定するマルチバスコネクション設定手段12と、そのマルチバスコネクションにフラッディングされるバケットは同一であることを示す識別情報を付加する識別情報付加手段11と、移動機3の周辺ゾーン基地局2-2、2-3経由のマルチバスコネクション上を転送するバケットを遅延させるバケット遅延手段13とを備え、移動機3に、受信されるバケットの識別情報を参照し、重複受信バケットを廃棄する受信順序制御手段15を備えた。



【特許請求の範囲】

【請求項1】 一定ゾーン内の移動機と無線回線を経由してその移動機の制御および通信を行う基地局と、前記移動機向けの最適な基地局に至る交換網の適切な通信経路の設定を行うクロスオーバー交換局からなる通信網に、通信情報として定型のヘッダ情報を持つ固定長または可変長のバケットを転送する移動体通信網制御装置において、前記クロスオーバー交換局は、在圏ゾーン基地局經由前記移動機宛ておよび前記移動機が移動する可能性のある周辺ゾーン基地局經由前記移動機宛てのマルチ

バスコネクションを設定するマルチバスコネクション設定手段と、そのマルチバスコネクションにフラッディングされるバケットは同一であることを示す識別情報をそのバケットに付加する識別情報付加手段と、前記移動機の前記在圏ゾーン基地局經由を除き、移動する可能性のある前記周辺ゾーン基地局經由のマルチバスコネクション上を転送するバケットを遅延させるバケット遅延手段とを備え、前記移動機は、前記在圏ゾーン基地局および前記周辺ゾーン基地局から受信されるバケットの前記識別情報を参照し、重複受信バケットを廃棄する受信順序制御手段を備えたことを特徴とする移動体通信網制御装置。

【請求項2】 移動機およびクロスオーバー交換局には、その移動機が在圏ゾーンに定着している状態の通常モードと、その移動機が在圏ゾーンから脱出しハンドオーバーが発生する可能性が高い状態のハンドオーバーモードとを有し、前記移動機は、当該移動機が在圏ゾーンから脱出する可能性が高いか否かを検出するゾーン移動検出手段と、通常モード時に、前記ゾーン移動検出手段による検出が在圏ゾーンから脱出する可能性が高い状態であると判断した場合に、前記クロスオーバー交換局にゾーン脱出予告メッセージを送信すると共に、当該移動機をハンドオーバーモードにするゾーン脱出予告メッセージ通知手段と、ハンドオーバーモード時に、前記ゾーン移動検出手段による検出が在圏ゾーンに定着した状態であると判断した場合に、前記クロスオーバー交換局にゾーン定着メッセージを送信すると共に、当該移動機を通常モードにするゾーン定着メッセージ通知手段とを備え、前記クロスオーバー交換局は、ゾーン脱出予告メッセージおよびゾーン定着メッセージの受信に応じてハンド

チバスコネクション上を転送するバケットを遅延させ、通常モード時に、マルチバスコネクション設定手段により、在圏ゾーン基地局經由前記移動機宛てのみのコネクションを設定すると共に、識別情報付加手段による識別情報のバケットへの付加を停止することを特徴とする請求項1記載の移動体通信網制御装置。

【請求項3】 クロスオーバー交換局は、移動機宛てコネクション毎にバケット消失に対して厳しく要求されるか、バケット遅延に対して厳しく要求されるかの通信品質が記憶された第1通信品質記憶手段を有し、ハンドオーバーモード時に、コネクションに要求されている通信品質がバケット消失に対して厳しい場合に、バケット遅延手段により、周辺ゾーン基地局經由のマルチバスコネクション上を転送するバケットを遅延させ、コネクションに要求されている通信品質がバケット遅延に対して厳しい場合に、そのバケット遅延手段によるバケットの遅延を停止させることを特徴とする請求項2記載の移動体通信網制御装置。

【請求項4】 移動機は、受信されたバケットを蓄積するバッファ手段と、そのバッファ手段に蓄積されたバケットの取り出し時間間隔を任意に調整自在なバケット取り出し手段とを備えたことを特徴とする請求項2または請求項3記載の移動体通信網制御装置。

【請求項5】 移動機は、コネクション毎にバッファ手段およびバケット取り出し手段を接続するか否かの通信品質が記憶された第2通信品質記憶手段を有し、それらバッファ手段およびバケット取り出し手段は、コネクション毎にその第2通信品質記憶手段に基づいて接続することを特徴とする請求項4記載の移動体通信網制御装置。

【請求項6】 移動機は、在圏ゾーン基地局および周辺ゾーン基地局から受信される信号状態を測定し、移動先ゾーンを予測する移動先ゾーン予測手段を備え、ゾーン脱出予告メッセージ通知手段は、ゾーン脱出予告メッセージに、前記移動先ゾーン予測手段により予測された移動先ゾーンを付加してクロスオーバー交換局に送信し、そのクロスオーバー交換局は、その受信されたゾーン脱出予告メッセージ中の移動先ゾーンに応じてマルチバスコネクションを設定すべき周辺ゾーンを決定することを特徴とする請求項2から請求項5のうちのいずれか1項記載の移動体通信網制御装置。

【請求項7】 移動機および基地局は、GPS等の位置測定システムによるそれら移動機および基地局の位置情報を受信する位置情報受信手段を備え、前記基地局は、その受信された位置情報に基づいて、当該基地局のゾーン内の前記移動機にその基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知する基地局位置情報メッセージ通知手段を備え、前記移動機のゾーン移動検出手段は、その受信された基地局位置情報メッセージの前記基地局の位置情報および有効ゾーン距

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離と前記位置測定システムから受信された当該移動機の位置情報に応じて在圏ゾーンから脱出する可能性の有無を判断することを特徴とする請求項2から請求項5のうちのいずれか1項記載の移動体通信網制御装置。

【請求項8】 移動機および基地局は、GPS等の位置測定システムによるそれら移動機および基地局の位置情報を受信する位置情報受信手段を備え、前記基地局は、その受信された位置情報に基づいて、在圏ゾーンおよび周辺ゾーンの前記移動機にその基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知する基地局位置情報メッセージ通知手段を備え、前記移動機のゾーン移動検出手段は、当該移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、その受信された基地局位置情報メッセージの前記基地局の位置情報および有効ゾーン距離と前記位置測定システムから受信された当該移動機の位置情報に応じて移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信することを特徴とする請求項6記載の移動体通信網制御装置。

【請求項9】 移動機および基地局は、GPS等の位置測定システムによるそれら移動機および基地局の位置情報を受信する位置情報受信手段を備え、前記各基地局は、その受信された位置情報に基づいて、周辺ゾーン基地局に対して当該基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知すると共に、当該在圏ゾーンの移動機に対して当該基地局および周辺ゾーン基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知する基地局位置情報メッセージ通知手段を備え、前記移動機のゾーン移動検出手段は、当該移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、その受信された基地局位置情報メッセージの前記基地局および周辺ゾーン基地局の位置情報および有効ゾーン距離と前記位置測定システムから受信された当該移動機の位置情報に応じて移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信することを特徴とする請求項6記載の移動体通信網制御装置。

【請求項10】 移動機は、受信された基地局位置情報メッセージに応じたこれまで通過したゾーンの基地局の位置情報に基づいて在圏ゾーンにおける当該移動機の移動方向と、GPS等の位置測定システムによる当該移動機の位置情報に基づいて在圏ゾーンにおけるその移動機の移動方向との継続性からその移動機の移動方向を認識する移動方向認識手段を備え、前記移動機のゾーン移動検出手段は、当該移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、その移動方向認識手段によって認識されたその移動機の移動方向に応じて移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信することを特徴とする請求項7から請求項9のうちのい

ずれか1項記載の移動体通信網制御装置。

【請求項11】 移動機は、受信された基地局位置情報メッセージに応じたこれまで通過したゾーンの基地局の位置情報に基づいて在圏ゾーンにおける当該移動機の移動速度と、GPS等の位置測定システムによる当該移動機の位置情報に基づいて在圏ゾーンにおけるその移動機の移動速度との継続性からその移動機の移動速度を認識する移動速度認識手段を備え、前記移動機のゾーン移動検出手段は、当該移動機が在圏ゾーンから脱出する可能性が高く、且つ前記移動速度認識手段によって認識された移動速度が高いと判断した場合に、移動方向認識手段によって認識されたその移動機の移動方向に応じて在圏ゾーンに隣接する移動先ゾーンおよびその後の移動によってその移動先ゾーンに隣接する移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測されたそれら移動先ゾーンを付加してクロスオーバー交換局に送信することを特徴とする請求項10記載の移動体通信網制御装置。

【請求項12】 移動機は、GPS等の位置測定システムによる当該移動機の位置情報に基づいて在圏ゾーンにおけるその移動機の移動方向と移動速度とを認識すると共に、それら移動機の移動方向と移動速度とを移動機情報メッセージとしてクロスオーバー交換局に送信する移動機情報メッセージ送信手段と、当該移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、その在圏ゾーンにおける移動機の移動方向と移動速度とを付加したゾーン脱出予告メッセージとしてクロスオーバー交換局に送信するゾーン脱出予告メッセージ通知手段とを備え、クロスオーバー交換局は、受信された移動機情報メッセージに応じた移動機の移動方向と移動速度、および受信されたゾーン脱出予告メッセージに応じた移動機の移動方向と移動速度に基づいて、移動方向および移動速度の継続性、その移動速度が高いか判断し、移動速度が高いと判断した場合に、その移動機の移動方向に応じて在圏ゾーンに隣接する移動先ゾーンおよびその後の移動によってその移動先ゾーンに隣接する移動先ゾーンを予測し、それら移動先ゾーンに応じてマルチバスコネクションを設定すべき周辺ゾーンを決定することを特徴とする請求項7から請求項9のうちのいずれか1項記載の移動体通信網制御装置。

【請求項13】 識別情報付加手段は、識別情報を生成する十分なモジュロのカウンタ手段を有し、クロスオーバー交換局から各マルチバスコネクションにおいてパケットをコピー転送する際に、前記カウンタ手段の値を前記識別情報として付加すると共にカウントアップし、識別番号として順序番号を使用することを特徴とする請求項1から請求項12のうちのいずれか1項記載の移動体通信網制御装置。

【請求項14】 識別情報付加手段は、識別情報を生成するクロスオーバー交換局に必要な精度の時計手段を有

し、そのクロスオーバー交換局から各マルチバスコネクションにおいてパケットをコピー転送する際に、前記時計手段の時刻情報を前記識別情報として付加し、識別番号として時刻情報を使用することを特徴とする請求項1から請求項12のうちのいずれか1項記載の移動体通信網制御装置。

【請求項15】 マルチバスコネクション設定手段は、在圏ゾーン基地局經由移動機宛てのコネクションと、移動機が移動する可能性のある周辺ゾーン基地局經由前記移動機宛てのコネクションの2つのコネクションに分歧され、パケットのコピーをしてそれら2つのコネクションに送信する第1パケット分歧手段を有し、パケット遅延手段は、周辺ゾーン基地局經由前記移動機宛ての前記コネクションに関し、パケット遅延を実現するパケット遅延バッファ手段を有し、マルチバスコネクション設定手段はさらに、移動機が移動する可能性のある周辺ゾーン基地局が複数ある場合は、その複数に応じて前記遅延されたパケットのコピーを行う第2パケット分歧手段を有することを特徴とする請求項1から請求項12のうちのいずれか1項記載の移動体通信網制御装置。

【請求項16】 基地局およびクロスオーバー交換局の機能を合わせ持つ装置を、基地局およびクロスオーバー交換局として用いることを特徴とする請求項1から請求項15のうちのいずれか1項記載の移動体通信網制御装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、一定ゾーン内の移動機と無線回線を経由してその移動機の制御および通信を行う基地局と、移動機向けの最適な基地局に至る交換網の適切な通信経路の設定を行うクロスオーバー交換局からなる移動体通信網において、音声やデータ等の情報を、定型のヘッダ情報を持つ固定長または可変長のパケットやATMセルとして転送する場合の移動体通信網制御装置に関するものである。

【0002】

【従来の技術】図19は例えば特開平5-91555号公報に示された従来の移動体通信網制御装置を示すブロック構成図であり、図において、100-1~100-3は無線ゾーン、101-1~101-3は無線ゾーン100-1~100-3を形成する基地局、103は移動機、104は基地局101-1~101-3を制御するクロスオーバー交換局である。ここで、移動機103は、基地局101-1~101-3と通信チャネルを切り換えながら通信を行うものである。

【0003】次に動作について説明する。移動機103が在圏ゾーン基地局101-1と通信を行いながら移動する場合、その周辺ゾーン基地局101-2、101-3の通信チャネルの予約を行う。また、その在圏ゾーン基地局101-1の通信品質劣化の検出によりチャネル

切り換えを行う場合、周辺ゾーン基地局101-2または101-3の予約されたチャネルにチャネル切り換えを行うものである。

【0004】

【発明が解決しようとする課題】従来の移動体通信網制御装置は以上のように構成されているので、在圏ゾーン基地局101-1から移動先ゾーン基地局101-2または101-3へのコネクションの切り換え処理に伴ない、通信情報が消失するという課題があった。特に、音声やデータの情報をパケットまたはATMセルのような形式で高速に伝送する場合、パケットやATMセルの消失による欠損する情報量の増大が顕著であり、また、移動機103が高速に移動する場合や、ゾーン域を小さく設定する場合は、切り換え処理が多発し通信品質を大きく劣化させる要因となるなどの課題があった。

【0005】この発明は上記のような課題を解決するためになされたもので、高速通信、高速移動およびゾーン領域の狭い移動体通信網における切り換え制御において、クロスオーバー交換局から基地局への通信バスの切り換えに伴う通信情報の消失を防止する移動体通信網制御装置を得ることを目的とする。

【0006】

【課題を解決するための手段】この発明に係る移動体通信網制御装置は、クロスオーバー交換局に、在圏ゾーン基地局經由移動機宛ておよび移動機が移動する可能性のある周辺ゾーン基地局經由移動機宛てのマルチバスコネクションを設定するマルチバスコネクション設定手段と、そのマルチバスコネクションにフラッディングされるパケットは同一であることを示す識別情報をパケットに付加する識別情報付加手段と、移動機の在圏ゾーン基地局經由を除き、周辺ゾーン基地局經由のマルチバスコネクション上を転送するパケットを遅延させるパケット遅延手段とを備え、移動機に、在圏ゾーン基地局および周辺ゾーン基地局から受信されるパケットの識別情報を参照し、重複受信パケットを廃棄する受信順序制御手段を備えたものである。

【0007】この発明に係る移動体通信網制御装置は、移動機およびクロスオーバー交換局には、移動機が在圏ゾーンに定着している状態の通常モードと、移動機が在圏ゾーンから脱出しハンドオーバーが発生する可能性が高い状態のハンドオーバーモードとを有し、移動機は、移動機が在圏ゾーンから脱出する可能性が高いか否かを検出するゾーン移動検出手段と、通常モード時に、ゾーン移動検出手段による検出が在圏ゾーンから脱出する可能性が高い状態であると判断した場合に、クロスオーバー交換局にゾーン脱出予告メッセージを送信すると共に、移動機をハンドオーバーモードにするゾーン脱出予告メッセージ通知手段と、ハンドオーバーモード時に、ゾーン移動検出手段による検出が在圏ゾーンに定着した状態であると判断した場合に、クロスオーバー交換局に

ゾーン定着メッセージを送信すると共に、移動機を通常モードにするゾーン定着メッセージ通知手段とを備え、クロスオーバー交換局は、ゾーン脱出予告メッセージおよびゾーン定着メッセージの受信に応じてハンドオーバーモードまたは通常モードを認識し、ハンドオーバーモード時に、マルチバスコネクション設定手段により、在圏ゾーン基地局経由移動機宛ておよび周辺ゾーン基地局経由移動機宛てのマルチバスコネクションを設定すると共に、識別情報付加手段により、マルチバスコネクションにフラッディングされるパケットは同一であることを示す識別情報をパケットに付加し、パケット遅延手段により、移動機の在圏ゾーン基地局経由を除き、周辺ゾーン基地局経由のマルチバスコネクション上を転送するパケットを遅延させ、通常モード時に、マルチバスコネクション設定手段により、在圏ゾーン基地局経由移動機宛てのみのコネクションを設定すると共に、識別情報付加手段による識別情報のパケットへの付加を停止するものである。

【0008】この発明に係る移動体通信網制御装置は、クロスオーバー交換局に、移動機宛てコネクション毎にパケット消失に対して厳しく要求されるか、パケット遅延に対して厳しく要求されるかの通信品質が記憶された第1通信品質記憶手段を有し、ハンドオーバーモード時に、コネクションに要求されている通信品質がパケット消失に対して厳しい場合に、パケット遅延手段により、周辺ゾーン基地局経由のマルチバスコネクション上を転送するパケットを遅延させ、コネクションに要求されている通信品質がパケット遅延に対して厳しい場合に、パケット遅延手段によるパケットの遅延を停止させるものである。

【0009】この発明に係る移動体通信網制御装置は、移動機に、受信されたパケットを蓄積するバッファ手段と、そのバッファ手段に蓄積されたパケットの取り出し時間間隔を任意に調整自在なパケット取り出し手段とを備えたものである。

【0010】この発明に係る移動体通信網制御装置は、移動機に、コネクション毎にバッファ手段およびパケット取り出し手段を接続するか否かの通信品質が記憶された第2通信品質記憶手段を有し、バッファ手段およびパケット取り出し手段は、コネクション毎に第2通信品質記憶手段に基づいて接続するものである。

【0011】この発明に係る移動体通信網制御装置は、移動機に、在圏ゾーン基地局および周辺ゾーン基地局から受信される信号状態を測定し、移動先ゾーンを予測する移動先ゾーン予測手段を備え、ゾーン脱出予告メッセージ通知手段は、ゾーン脱出予告メッセージに、移動先ゾーン予測手段により予測された移動先ゾーンを付加してクロスオーバー交換局に送信し、クロスオーバー交換局は、受信されたゾーン脱出予告メッセージ中の移動先ゾーンに応じてマルチバスコネクションを設定すべき周

辺ゾーンを決定するものである。

【0012】この発明に係る移動体通信網制御装置は、移動機および基地局に、GPS等の位置測定システムによる移動機および基地局の位置情報を受信する位置情報受信手段を備え、基地局は、受信された位置情報に基づいて、基地局のゾーン内の移動機に基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知する基地局位置情報メッセージ通知手段を備え、移動機のゾーン移動検出手段は、受信された基地局位置情報メッセージの基地局の位置情報および有効ゾーン距離と位置測定システムから受信された移動機の位置情報に応じて在圏ゾーンから脱出する可能性の有無を判断するものである。

【0013】この発明に係る移動体通信網制御装置は、移動機および基地局に、GPS等の位置測定システムによる移動機および基地局の位置情報を受信する位置情報受信手段を備え、基地局は、受信された位置情報に基づいて、在圏ゾーンおよび周辺ゾーンの移動機に基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知する基地局位置情報メッセージ通知手段を備え、移動機のゾーン移動検出手段は、移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、受信された基地局位置情報メッセージの基地局の位置情報および有効ゾーン距離と位置測定システムから受信された移動機の位置情報に応じて移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信するものである。

【0014】この発明に係る移動体通信網制御装置は、移動機および基地局は、GPS等の位置測定システムによる移動機および基地局の位置情報を受信する位置情報受信手段を備え、各基地局は、受信された位置情報に基づいて、周辺ゾーン基地局に対して基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知すると共に、在圏ゾーンの移動機に対して基地局および周辺ゾーン基地局の位置情報および有効ゾーン距離を示す基地局位置情報メッセージを通知する基地局位置情報メッセージ通知手段を備え、移動機のゾーン移動検出手段は、移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、受信された基地局位置情報メッセージの基地局および周辺ゾーン基地局の位置情報および有効ゾーン距離と位置測定システムから受信された移動機の位置情報に応じて移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信するものである。

【0015】この発明に係る移動体通信網制御装置は、移動機に、受信された基地局位置情報メッセージに応じたこれまで通過したゾーンの基地局の位置情報に基づいて在圏ゾーンにおける移動機の移動方向と、GPS等の位置測定システムによる移動機の位置情報に基づいて在圏ゾーンにおける移動機の移動方向との継続性から移動

機の移動方向を認識する移動方向認識手段を備え、移動機のゾーン移動検出手段は、移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、移動方向認識手段によって認識された移動機の移動方向に応じて移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信するものである。

【0016】この発明に係る移動体通信網制御装置は、移動機に、受信された基地局位置情報メッセージに応じたこれまで通過したゾーンの基地局の位置情報に基づいて在圏ゾーンにおける移動機の移動速度と、GPS等の位置測定システムによる移動機の位置情報に基づいて在圏ゾーンにおける移動機の移動速度との継続性から移動機の移動速度を認識する移動速度認識手段を備え、移動機のゾーン移動検出手段は、移動機が在圏ゾーンから脱出する可能性が高く、且つ移動速度認識手段によって認識された移動速度が高いと判断した場合に、移動方向認識手段によって認識された移動機の移動方向に応じて在圏ゾーンに隣接する移動先ゾーンおよびその後の移動によって移動先ゾーンに隣接する移動先ゾーンを予測し、ゾーン脱出予告メッセージに、予測された移動先ゾーンを付加してクロスオーバー交換局に送信するものである。

【0017】この発明に係る移動体通信網制御装置は、移動機に、GPS等の位置測定システムによる移動機の位置情報に基づいて在圏ゾーンにおける移動機の移動方向と移動速度とを認識すると共に、移動機の移動方向と移動速度とを移動機情報メッセージとしてクロスオーバー交換局に送信する移動機情報メッセージ送信手段と、移動機が在圏ゾーンから脱出する可能性が高いと検出した場合に、在圏ゾーンにおける移動機の移動方向と移動速度とを付加したゾーン脱出予告メッセージとしてクロスオーバー交換局に送信するゾーン脱出予告メッセージ通知手段とを備え、クロスオーバー交換局は、受信された移動機情報メッセージに応じた移動機の移動方向と移動速度、および受信されたゾーン脱出予告メッセージに応じた移動機の移動方向と移動速度に基づいて、移動方向および移動速度の継続性、その移動速度が高いか判断し、移動速度が高いと判断した場合に、移動機の移動方向に応じて在圏ゾーンに隣接する移動先ゾーンおよびその後の移動によって移動先ゾーンに隣接する移動先ゾーンを予測し、それら移動先ゾーンに応じてマルチバスコネクションを設定すべき周辺ゾーンを決定するものである。

【0018】この発明に係る移動体通信網制御装置は、識別情報付加手段に、識別情報を生成する十分なモジュールのカウンタ手段を有し、クロスオーバー交換局から各マルチバスコネクションにおいてパケットをコピー転送する際に、カウンタ手段の値を識別情報として付加すると共にカウントアップし、識別番号として順序番号を使

用するものである。

【0019】この発明に係る移動体通信網制御装置は、識別情報付加手段に、識別情報を生成するクロスオーバー交換局に必要な精度の時計手段を有し、クロスオーバー交換局から各マルチバスコネクションにおいてパケットをコピー転送する際に、時計手段の時刻情報を識別情報として付加し、識別番号として時刻情報を使用するものである。

【0020】この発明に係る移動体通信網制御装置は、マルチバスコネクション設定手段は、在圏ゾーン基地局経由移動機宛てのコネクションと、移動機が移動する可能性のある周辺ゾーン基地局経由移動機宛てのコネクションの2つのコネクションに分岐され、パケットのコピーをしてそれら2つのコネクションに送信する第1パケット分岐手段を有し、パケット遅延手段は、周辺ゾーン基地局経由移動機宛てのコネクションに関し、パケット遅延を実現するパケット遅延バッファ手段を有し、マルチバスコネクション設定手段はさらに、移動機が移動する可能性のある周辺ゾーン基地局が複数ある場合は、その複数に応じて遅延されたパケットのコピーを行う第2パケット分岐手段を有するものである。

【0021】この発明に係る移動体通信網制御装置は、基地局およびクロスオーバー交換局の機能を合わせ持つ装置を、基地局およびクロスオーバー交換局として用いるものである。

【0022】

【発明の実施の形態】以下、この発明の実施の一形態を説明する。

実施の形態1. 図1はこの発明の実施の形態1による移動体通信網制御装置を示すブロック構成図であり、図において、1は移動機向けの基地局に至る移動体交換網の適切な通信経路の設定を行うクロスオーバー交換局、2は一定ゾーン内の移動機と無線回線を経由して移動機の制御および通信を行う基地局であり、その内、2-1は移動機が通信中の在圏ゾーン基地局、2-2、2-3は移動機が移動する可能性のある周辺ゾーン基地局である。3は移動体通信網においてゾーン間を移動する場合にハンドオーバー制御（切り換え制御）により通信を継続する移動機である。

【0023】クロスオーバー交換局1において、10は他の交換局との接続を実現する交換局間インタフェース、11はマルチバスコネクションにフラッディングされるパケットが同一であることを認識するための識別情報をパケットに付加する識別情報付加手段、12はフラッディングするコネクションの設定を制御するマルチバスコネクション設定手段、13は必要なコネクションのパケットのみを一定時間保留した後に基地局宛ての経路に転送するパケット遅延手段である。また、移動機3において、15は受信パケットに付加された識別情報を参照し受信パケットの順序を整える受信順序制御手段、1

6はデータの送受信を行いながら処理を実行する上位処理手段である。

【0024】図2はこの発明の実施の形態1による移動体通信網制御装置の動作を示すシーケンス図であり、図1による移動体通信網制御装置において、移動機3がゾーンを移動し、ハンドオーバー制御が行われた場合のシーケンスである。図3はクロスオーバー交換局の識別情報付加手段の一例を示すブロック構成図であり、図において、20はバケット情報を格納するバケットバッファ、21は識別情報を生成するカウンタ手段である。図4はクロスオーバー交換局の識別情報付加手段の他の例を示すブロック構成図であり、図において、22は順次処理するバケットを識別するに十分な精度を持った時計手段である。

【0025】図5はクロスオーバー交換局のマルチバスコネクション設定手段およびバケット遅延手段の一例を示すブロック構成図であり、図において、25は在圏ゾーン基地局2-1宛てコネクションおよび周辺ゾーン基地局2-2、2-3宛てコネクションへのマルチバスコネクションの設定を制御するマルチバスコネクション設定制御手段、26は周辺ゾーン基地局2-2、2-3宛てコネクションのバケットを遅延させるバケット遅延バッファ手段、27は各基地局2向けにバケットを送信する送信処理手段、28は在圏ゾーン基地局2-1宛てコネクションと周辺ゾーン基地局2-2、2-3宛てコネクションを分岐させる第1バケット分岐手段、29は複数の周辺ゾーン基地局2-2、2-3宛てコネクションを分岐させる第2バケット分岐手段である。

【0026】次に動作について説明する。まず、図1において移動体通信網制御装置の動作について説明する。図1は移動機3が、在圏ゾーン基地局2-1がサービスするゾーンに位置し、通信を行っている状態であり、移動機3を管理するクロスオーバー交換局1は、隣接する交換局から移動機3宛てのバケットを、交換局間インタフェース10を通して受信する。その後、マルチバスコネクションにフラッディングされるバケットが同一であることを認識するための識別情報を識別情報付加手段11により付加し、マルチバスコネクション設定手段12により、設定された各コネクションごとにバケットをコピーする。移動機3が位置する在圏ゾーン基地局2-1宛てコネクションのバケットは、即座に転送する。また、移動機3が移動する可能性のある周辺ゾーン基地局2-2、2-3宛てコネクションのバケットは、バケット遅延手段13に指定された時間だけ蓄積し、その後、各周辺ゾーン基地局2-2、2-3宛てコネクションを通して転送する。そして、在圏ゾーン基地局2-1および周辺ゾーン基地局2-2、2-3は、クロスオーバー交換局1から転送されたバケットを、無線回線を通して移動機3宛てに転送する。移動機3はバケットを受信し、受信順序制御手段15において受信バケットの識別

情報を認識し、本方式のハンドオーバー時に発生する重複受信やバケット消失を検出し、バケットを順序通りに制御した上で、移動機3内部の上位処理手段16に渡す。

【0027】図2において、移動体通信網において移動機3が在圏ゾーン基地局2-1のゾーンから周辺ゾーン基地局2-2のゾーン移動するハンドオーバー制御におけるバケットシーケンスを説明する。移動機3が在圏ゾーン基地局2-1のゾーンにいる場合、バケット(1)クロスオーバー交換局1から在圏ゾーン基地局2-1宛てのコネクション(マルチバスコネクションの1つ)で転送され、在圏ゾーン基地局2-1から移動機3が使用している無線チャネルを通して移動機3に転送され、受信される。同時に、クロスオーバー交換局1は、バケット(1)をバケット遅延手段13により一時保留し、その後、移動機3が移動する可能性のある周辺ゾーン基地局2-2および2-3宛てのコネクション(マルチバスコネクションの1つまたは複数)で各周辺ゾーン基地局2-2、2-3に転送され、その基地局において移動機3への無線チャネルが無い場合は、バケット(1)は廃棄される。その基地局において移動機3への無線チャネルが確立または予約されていた場合は、移動機3が使用している無線チャネルを通して移動機3に転送される。継続するバケット(2)も同様に、在圏ゾーン基地局2-1経由で移動機3に受信される。

【0028】この後、移動機3は、在圏ゾーン基地局2-1との通信を通信品質劣化等の理由により中断し、通信品質の良好な周辺ゾーン基地局2-2との通信チャネルに切り替えるハンドオーバー制御を開始する。この間、在圏ゾーン基地局2-1との無線通信チャネルの解放や、周辺ゾーン基地局2-2との無線通信チャネルの設定、移動機3とクロスオーバー交換局1との間の情報交換など、ハンドオーバー制御を行う必要があり、その処理を行う時間の間、バケット通信ができない状態が発生する。移動機3においてハンドオーバー制御が開始された後、バケット(3)はクロスオーバー交換局1から在圏ゾーン基地局2-1宛てのコネクション(マルチバスコネクションの1つ)で転送され、在圏ゾーン基地局2-1から移動機3が使用している無線チャネルで転送されるが、移動機3がハンドオーバー制御に入っているため、受信されず消失することになる。以後のバケット(4)、(5)も在圏ゾーン基地局2-1経由で移動機3に転送されるが、受信されず消失することになる。従来はこのように、ハンドオーバー制御の間の受信バケットは消失してしまい、上位レイヤプロトコルなどを使用して回復していた。しかし、移動機3が高速に移動することによりハンドオーバー制御が頻発するようになり、同時に通信速度も高速になることに伴い、消失するバケット数は増大し、通信品質劣化の大きな原因となる。

【0029】この実施の形態1では、在圏ゾーン基地局2-1経由で移動機3に転送されたバケット(1)～

(5)と同様のバケットがバケット遅延手段13による一定の遅延時間を経た後に、クロスオーバー交換局1から周辺ゾーン基地局2-2、2-3へのマルチバスコネクションにより転送されるように構成している。移動機3は、前記ハンドオーバー制御を終了し、移動先ゾーン基地局(ハンドオーバー前の周辺ゾーン基地局)2-2との通信チャネルを設定し、通信を開始する。その後、クロスオーバー交換局1のバケット遅延手段13により遅延されたバケット(2)は、移動先ゾーン基地局2-2経由で移動機3に転送され、受信される。移動機3は、受信順序制御手段15により受信バケットの識別情報を参照し、在圏ゾーン基地局2-1から受信済みのバケットであることを認識し、重複バケットとして廃棄する。次に、クロスオーバー交換局1のバケット遅延手段13により遅延されたバケット(3)～(5)が、移動先ゾーン基地局2-2経由で移動機3に転送され受信される。移動機3は、受信順序制御手段15により受信バケットの識別情報を参照し、在圏ゾーン2-1にて受信済みのバケットに継続するバケットであることを認識し、上位処理手段16に渡す。

【0030】以上のように、クロスオーバー交換局1から周辺ゾーンへのマルチバスコネクションを設定し、バケットを遅延させて転送することにより、ハンドオーバー制御によるバケット消失を防ぎ、品質の高い通信が継続できる。

【0031】次に図3に示した識別情報付加手段11について説明する。クロスオーバー交換局1は、バケットに付加される識別情報の生成手段として、適当な大きさのカウンタ手段21を持つ。移動機3宛てバケットを受信した場合、バケットバッファ20に受信バケットを格納し、この適当な識別情報領域に、カウンタ手段21によるカウンタ値を書き込み、そのカウンタ手段21をカウントアップする。この識別情報が付加されたバケットは、マルチバスコネクションにより各基地局宛てにコピーされ転送される。

【0032】以上のように、識別情報として適当なモジュロの巡回変数を使用することにより、移動機3における重複バケットが検出できると同時に、消失バケットの検出や、クロスオーバー交換局1と移動機3の間の再送制御に活用することも可能である。

【0033】次に図4に示した識別情報付加手段11について説明する。クロスオーバー交換局1は、バケットに付加される識別情報の生成手段として、クロスオーバー交換局1が受信するバケットを一意的に識別できるに十分な精度の時計手段22を持つ。移動機3宛てバケットを受信した場合、バケットバッファ20に受信バケットを格納し、この適当な識別情報領域に、時計手段22による時刻情報を書き込む。この識別情報が付加されたバ

ケットは、マルチバスコネクションにより各基地局宛てにコピーされ転送される。

【0034】以上のように、識別情報として適当な精度の時刻情報を使用することにより、移動機3における重複バケットが検出できると同時に、バケット再生時の揺らぎ補正処理に活用することが可能である。

【0035】次に図5に示したマルチバスコネクション設定手段12およびバケット遅延手段13について説明する。クロスオーバー交換局1は、移動機3宛てのバケットを、在圏ゾーン基地局2-1経由で転送するコネクションと、1つまたは複数の周辺ゾーン基地局2-2、2-3経由で転送するコネクションの、2つのコネクション向けに分岐させるために、第1バケット分岐手段28によりバケットをコピーする。在圏ゾーン基地局2-1経由で転送するコネクション向けバケットは、直ちに送信処理手段27から転送される。周辺ゾーン基地局2-2、2-3経由で転送するコネクション向けバケットは、バケット遅延手段13を実現するバケット遅延バッファ手段26に指定された時間蓄積される。その後、バケット遅延バッファ手段26から取り出され、転送すべき周辺ゾーン基地局2-2、2-3の数に従って、周辺ゾーン基地局2-2、2-3分のコネクション向けにバケットを分岐させるために、第2バケット分岐手段29によりバケットをコピーする。各コピーされたバケットは、送信処理手段27から各々の宛先周辺ゾーン基地局2-2、2-3に転送される。第1バケット分岐手段28で、周辺ゾーン基地局2-2、2-3向けコネクションに分岐させるか否か、およびどの周辺ゾーン基地局2-2、2-3向けコネクションに分岐させるかは、マルチバスコネクション設定制御手段25において管理し、分岐制御を第1バケット分岐手段28および第2バケット分岐手段29に指示する。

【0036】このように、第1バケット分岐手段28および第2バケット分岐手段29を持つことにより、バケット遅延手段13を実現するバケット遅延バッファ手段26のメモリ容量を少なく構成することができる。

【0037】実施の形態2. 図6はこの発明の実施の形態2による移動体通信網制御装置の移動機における通常モード時の動作フロー図、図7は移動機におけるハンドオーバーモード時の動作フロー図、図8はクロスオーバー交換局における通常モード時の動作フロー図、図9はクロスオーバー交換局のハンドオーバーモード時の動作フロー図である。

【0038】次に動作について説明する。移動機3は、ゾーン内で静止していたり、ゾーン中央部を低速で移動しているなど、在圏ゾーンに定着している通常モードと、ゾーンの境界領域を移動しているなど、在圏ゾーンから脱出しハンドオーバーが発生する可能性の高いハンドオーバーモードを内部状態として持ち、在圏ゾーンから脱出する可能性が高いことを認識するゾーン移動検出

手段を持つ。次に移動機3が通常モードの場合の動作を図6により説明する。移動機3が通常モードにある場合、ゾーン移動検出手段により在圏ゾーン脱出の可能性を判断し(ステップST1)、脱出の可能性が高いと判断した場合は、在圏ゾーン基地局2-1経由でクロスオーバー交換局1にゾーン脱出予告メッセージを通知する(ステップST2、ゾーン脱出予告メッセージ通知手段)。脱出の可能性が高くないと判断した後、またはゾーン脱出メッセージを送信した後に、受信バケットの識別情報が有意か無意かにより(ステップST3)、クロスオーバー交換局1がハンドオーバーモードと認識しているか否かを判断する。識別情報が有意であり、クロスオーバー交換局1が該当移動機3をハンドオーバーモードであると認識している場合は、移動機3のモードをハンドオーバーモードに移行する(ステップST4)。識別情報が無意の場合は、そのまま通常モードに止まる。通常モードに止まる場合、ゾーン脱出予告メッセージ通知(ステップST2)の頻発を防止する方法も有効である。

【0039】次に移動機3がハンドオーバーモードの場合の動作を図7により説明する。ゾーン移動検出手段により、在圏ゾーン脱出可能性を判断し(ステップST11)、脱出の可能性がなく定着と判断した場合は、在圏ゾーン基地局2-1経由でクロスオーバー交換局1にゾーン定着メッセージを通知する(ステップST12、ゾーン定着メッセージ通知手段)。脱出の可能性が高いと判断した場合、またはゾーン定着メッセージを送信した後に、受信バケットの識別情報が有意か無意かにより(ステップST13)、クロスオーバー交換局1がハンドオーバーモードと認識しているか否かを判断する。識別情報が無意であり、クロスオーバー交換局1が該当移動機3を通常モードであると認識している場合は、移動機3のモードを通常モードに移行する(ステップST14)。識別情報が有意である場合は、そのままハンドオーバーモードに止まる。ハンドオーバーモードに止まる場合、ゾーン定着メッセージ通知(ステップST12)の頻発を防止する方法も有効である。

【0040】次にクロスオーバー交換局1における動作について説明する。クロスオーバー交換局1は、管理する移動機3ごとに、該移動機3がゾーン内で静止していたり、ゾーン中央部を低速で移動しているなど、在圏ゾーンに定着している通常モードと、ゾーンの境界領域を移動しているなど、在圏ゾーンから脱出しハンドオーバーが発生する可能性の高いハンドオーバーモードを内部状態として持ち、移動機3のモードによって、在圏ゾーン基地局2-1経由のコネクションのみを設定しバケットを転送するか、在圏ゾーン基地局2-1および周辺ゾーン基地局2-2、2-3経由のマルチバスコネクションを設定しバケットを転送するかを、切り換える機能を付加したマルチバスコネクション設定手段12を持つ。

クロスオーバー交換局1における、通常モードの移動機3に関する動作を図8により説明する。クロスオーバー交換局1は、通常モードにある移動機3よりゾーン脱出予告メッセージを受信し(ステップST21)、移動機3が在圏ゾーンから脱出する可能性の高いことを認識する。次に識別情報付加手段11により、移動機3宛てのバケットへの識別情報の付加を開始する(ステップST22)。次に、移動機3が移動する可能性のある周辺ゾーンとして例えば在圏ゾーンの隣接ゾーンの全てを選択し、在圏ゾーンと周辺ゾーンの各基地局2-1~2-3経由移動機3へのマルチバスコネクションを設定し(ステップST23)、周辺ゾーン基地局2-2、2-3宛てコネクションのバケットを遅延させるように設定し(ステップST24)、移動機3のモードをハンドオーバーモードとする(ステップST25)。

【0041】次にクロスオーバー交換局1におけるハンドオーバーモードの移動機3に関する動作を図9により説明する。クロスオーバー交換局1は、ハンドオーバーモードにある移動機3よりゾーン定着メッセージを受信し(ステップST31)、移動機3が在圏ゾーンに定着したことを認識する。次に識別情報付加手段11により、移動機3宛てのバケットへの識別情報の付加は停止する(ステップST32)。次に、移動機3のその時点での在圏ゾーン基地局経由のコネクションのみを残し、他の周辺ゾーン基地局2-2、2-3経由のマルチバスコネクションを解放する(ステップST33)。そして、段階的に該当コネクションに設定していた遅延を減少させて行き(ステップST34)、移動機3のモードを通常モードとする(ステップST35)。

【0042】以上のように、移動機3およびクロスオーバー交換局1において移動機3ごとに通常モードとハンドオーバーモードを定義し、ハンドオーバーの可能性が高い移動機3に対してのみマルチバスコネクションを設定しバケットをフラディングし、ゾーンに定着した状態の移動機3に対しては通常のコネクションを設定してバケットを転送することにより、移動体通信網内のトラヒック量を低減することが可能となる。また、この実施の形態2における移動機3では、バケットに付加された識別情報の有無によりモードの移行を判断していたが、クロスオーバー交換局1が認識している該当移動機3のモード情報をバケットに付加された識別情報以外の手段で通知し、その情報によりモードの移行を判断しても同様の効果が期待できる。

【0043】図10はクロスオーバー交換局における通信品質記憶テーブルを示す概念図である。クロスオーバー交換局1は、例えば、図10に示すような通信品質記憶テーブル(第1通信品質記憶手段)を持ち、管理する各基地局、およびその基地局に在圏する各移動機、およびその移動機に設定されている通信コネクションごとに、そのコネクションが必要としている通信品質を記憶

する。例えば、通信品質としては、ATM通信のサービスクラスの中で、遅延は許容できるが消失には厳しいUBR、nrtVBRや、消失よりも遅延に対して厳しいrtVBRおよびCBRの通信品質を使用することができ。

【0044】次に動作について説明する。図6から図9の動作説明で示したように、クロスオーバー交換局1が通常モードとハンドオーバーモードを定義して、ハンドオーバーモードの移動機3に対してマルチバスコネクションでの通信を実現する場合、通信品質記憶テーブルを参照し、該当移動機の通信コネクションの要求通信品質により、適用するコネクション形態を個別に選択する。例えば、消失に対して厳しい通信品質のコネクションには、遅延を含むマルチバスコネクションを使用しバケットを転送するようにマルチバスコネクション設定手段12を動作させる。また、遅延に対して厳しい通信品質のコネクションには、遅延を含まないマルチバスコネクションを使用しバケットを転送するようにマルチバスコネクション設定手段12を動作させるか、または、通常のコネクションでの通信を継続する。

【0045】以上のように、コネクションに要求されている通信品質により、バケット消失に対して有効なコネクションと、リアルタイム性が強いがバケット消失の可能性のあるコネクションを、選択できるように構成することで、ハンドオーバー制御時でもコネクションの要求する通信品質を提供することが可能となる。

【0046】図11は移動機におけるハンドオーバー制御時のバケット取り出し処理を示すシーケンス図である。図11において、41は移動機3に設けられ、受信したバケットを蓄積するバッファ（バッファ手段）、また、移動機3にはバッファ41からのバケット取り出し時間間隔を調整自在なバケット取り出し手段を有する。

【0047】次に動作について説明する。移動機3がゾーン脱出予告メッセージを送信し、ハンドオーバーモードに移行した後、クロスオーバー交換局1から受信された識別情報が付加されたバケットは、移動機3のバッファ41に蓄積される。同時に、バッファ41から指定した時間間隔で蓄積バケットを取り出すバケット取り出し部の取り出し時間間隔として、平均的なバケット受信間隔Tよりも大きな値TLを設定し、外部装置40に対して許容できる範囲で通常モードより大きな間隔でバケットを転送する。このように移動機3がハンドオーバーモードになると、バッファ41に受信バケットが徐々に蓄積されていくが、その蓄積量を監視し一定量を超えるとバケット取り出し部の取り出し間隔TLを小さくし、蓄積量が少なくなると取り出し間隔TLを大きくし、外部装置40に対して許容できる範囲で取り出し間隔を調整する。移動機3がゾーン定着メッセージを送信し、通常モードに移行した後、バッファ41から蓄積バケットを取り出すバケット取り出し部の取り出し時間間隔とし

て、平均的なバケット受信間隔Tよりも小さな値TSを設定し、外部装置40に対して許容できる範囲で通常モードより小さい間隔でバケットを転送する。その後、バッファ41に蓄積されたバケットが無くなった時点で、受信バケットのバッファ41への蓄積を停止し、受信したバケットを外部装置40へ転送する。

【0048】以上のように、移動機3にバケットのバースト到着に適合しない外部装置40を接続した場合や、移動機3内のバケットのバースト到着に適合しない上位処理手段16との通信を行う場合、ハンドオーバー制御に伴うバケットトラヒックのバースト性を緩和することが可能となる。

【0049】また、移動機3に使用しているコネクションごとの通信品質を記憶する通信品質テーブル（第2通信品質記憶手段）を用意し、受信バケットを蓄積するバッファ41、およびバッファ41からのバケット取り出し時間間隔を調整できるバケット取り出し部を複数持たせた場合の動作について説明する。移動機3が、ハンドオーバーモードとなった場合、通信品質テーブルを参照しバースト性に適合しないコネクションごとに、バッファ41およびバケット取り出し部を割当てて。

【0050】以上のように、コネクションに適した個別の取り出し間隔でバケットを外部装置40または、内部の上位処理手段16に渡すことが可能となる。

【0051】実施の形態3。図12はこの発明の実施の形態3によるゾーン脱出予告メッセージのフォーマットを示す概念図であり、図において、50は移動機3からクロスオーバー交換局1に通知されるゾーン脱出予告メッセージである。図13はこの発明の実施の形態3による基地局位置情報メッセージのフォーマットの一例を示す概念図であり、図において、51は在圏ゾーン基地局2-1から移動機3に通知される当該在圏ゾーン基地局2-1の基地局位置情報メッセージである。図14はこの発明の実施の形態3による基地局位置情報メッセージのフォーマットの他の例を示す概念図であり、図において、52は在圏ゾーン基地局2-1から移動機3に通知される当該在圏ゾーン基地局2-1および周辺ゾーン基地局2-2、2-3の位置情報からなる基地局位置情報メッセージ、53は各基地局情報の詳細情報である。

【0052】次に動作について説明する。先ず、図12に示したゾーン脱出予告メッセージに基づいて動作を説明する。移動機3は、在圏ゾーン基地局2-1からの電波の受信レベルを測定する機能を持っている。また、在圏ゾーン基地局2-1から周辺ゾーン基地局2-2、2-3からの電波の周波数が通知されており、その受信レベルを測定する機能を持っている。この機能を使用して、在圏ゾーンの受信レベル劣化により、ゾーン脱出を判断すると同時に測定した周辺ゾーンの受信レベル状態により、移動の可能性のある周辺ゾーンを予測する（移動先ゾーン予測手段）。そこで、移動機3がゾーン脱出

の可能性が高いと判断し、クロスオーバー交換局1にゾーン脱出予告メッセージ50を通知する場合に、測定した周辺ゾーンの受信レベルに基づき、移動機3が判断した1つまたは複数の移動する可能性の高い周辺基地局の番号をゾーン脱出予告メッセージ50の情報要素として、クロスオーバー交換局1に通知する。ゾーン脱出予告メッセージ50を受信したクロスオーバー交換局1は、通知された周辺ゾーン基地局に対してマルチバスコネクションを設定し、ハンドオーバー制御を実行する。

【0053】以上のように、クロスオーバー交換局1が各移動機3の状態を詳細に把握しなくても、移動機3の持つ機能を活用し、移動機3が主体となって移動する可能性の高い周辺ゾーン基地局2-2、2-3を判断し、クロスオーバー交換局1に通知することにより、簡易にハンドオーバー時のマルチバスコネクションの設定が可能となる。

【0054】次に図13に示した基地局位置情報メッセージに基づいて動作を説明する。基地局2-1~2-3および移動機3は、GPS (Global Positioning System) 等の位置測定システムの信号を受信し、自分の経度および緯度などの位置情報を認識する機能を持たせる(位置情報受信手段)。基地局2-1~2-3は、周期的または適当なタイミングでゾーン内の移動機3に対して、在圏ゾーン基地局2-1の経度および緯度などの位置情報およびその電波の出力や方向などの有効ゾーン距離情報を、基地局位置情報メッセージ51として通知する(基地局位置情報メッセージ通知手段)。移動機3は、在圏ゾーン基地局2-1から基地局位置情報メッセージ51を受信し、在圏ゾーン基地局2-1の位置および有効ゾーンを認識すると共に、自分の位置情報の認識機能により自分の位置を認識し、これらの情報により、在圏ゾーンから脱出する可能性の有無を判断する(ゾーン移動検出手段)。

【0055】以上のように、在圏ゾーン基地局2-1の位置情報と移動機3の位置情報から移動機3がゾーン脱出の可能性を判断することにより、一時的な電波の乱れや、障害物の影響に耐久性のあるゾーン脱出の判断が可能となる。

【0056】さらに、図13に示した基地局位置情報メッセージに基づいて動作を説明する。基地局2-1~2-3および移動機3は、位置測定システムの信号を受信し、自分の経度および緯度などの位置情報を認識する機能を持つ(位置情報受信手段)。基地局2-1~2-3は、周期的または適当なタイミングでゾーン内およびゾーン周辺の移動機3に対して、各基地局2-1~2-3の経度および緯度などの位置情報およびその電波の出力や方向などの有効ゾーン距離情報を、基地局位置情報メッセージ51として通知する(基地局位置情報メッセージ通知手段)。移動機3は、在圏ゾーン基地局2-1との通信の空き時間を使用して、周辺ゾーン基地局2-

2、2-3からのメッセージを受信する機能を持ち、周辺ゾーン基地局2-2、2-3から基地局位置情報メッセージ51を受信し、周辺ゾーン基地局2-2、2-3の位置および有効ゾーン距離情報を認識すると共に、自分の位置情報の認識機能により自分の位置を認識し、これらの位置情報により移動機3が移動する可能性のある周辺ゾーンを予測する(ゾーン移動検出手段)。次に、クロスオーバー交換局1にゾーン脱出予告メッセージを通知する場合に、移動機3において予測した1つまたは複数の移動する可能性の高い周辺基地局の番号をゾーン脱出予告メッセージ50の情報要素として、クロスオーバー交換局1に通知する。ゾーン脱出予告メッセージ50を受信したクロスオーバー交換局1は、移動機3が通知した周辺ゾーン基地局に対してマルチバスコネクションを設定し、ハンドオーバー制御を実行する。

【0057】以上のように、周辺ゾーン基地局2-2、2-3の位置情報と移動機3の位置情報から移動機3が移動する可能性のある周辺ゾーンを予測することにより、一時的な電波の乱れや、障害物の影響に耐久性のある移動先ゾーンの予測が可能となり、また、クロスオーバー交換局1が各移動機3の状態を詳細に把握しなくても、移動機3の持つ機能を活用し、移動機3が主体となって移動する可能性の高い周辺ゾーン基地局を判断し、クロスオーバー交換局1に通知することにより、簡易にハンドオーバー時のマルチバスコネクションの設定が可能となる。

【0058】次に図14に示した基地局位置情報メッセージおよび基地局情報に基づいて動作を説明する。基地局2-1~2-3および移動機3は、位置測定システムの信号を受信し、自分の経度および緯度などの位置情報を認識する機能を持つ(位置情報受信手段)。在圏ゾーン基地局2-1は、適当なタイミングで周辺ゾーン基地局2-2、2-3に対して、自在圏ゾーン基地局2-1の経度および緯度などの位置情報およびその電波の出力や方向などの有効ゾーン距離情報からなる基地局情報53を、基地局位置情報メッセージ51として通知し、基地局相互間2-1~2-3でお互いの基地局情報を認識する。在圏ゾーン基地局2-1はそのゾーンに在圏する移動機3に対して、在圏ゾーン基地局2-1の基地局情報53および1つおよび複数の周辺ゾーン基地局情報53を持つ基地局位置情報メッセージ52を通知する(基地局位置情報メッセージ通知手段)。移動機3は、在圏ゾーン基地局2-1から一括して在圏ゾーン基地局2-1および周辺ゾーン基地局2-2、2-3の基地局情報53を認識し、在圏ゾーンから脱出の可能性の判断、および移動先ゾーンの予測に使用する(ゾーン移動検出手段)。

【0059】以上のように、移動機3は在圏ゾーン基地局2-1から一括して在圏ゾーン基地局2-1および周辺ゾーン基地局2-2、2-3の基地局情報53が入手

でき、基地局情報53の入手を簡易化することが可能となる。また、基地局の緯度および経度などの位置情報の測定のため位置測定システムを持たなくても、基地局に予め設定しておき、その位置情報を含む基地局情報53を相互に通知しても同様の効果が得られる。

【0060】実施の形態4。図15はこの発明の実施の形態4による移動機の通過ゾーンの移動方向および在圏ゾーン内の移動方向を示す説明図であり、図において、60-1、60-2は移動機3が通過したゾーンの基地局であり、61は移動機3の通過ゾーンから認識できる通過ゾーン移動方向である。在圏ゾーンにおいて、3-1は時刻T1における移動機3の位置であり、3-2はその後の時刻T2における移動機3の位置であり、62は在圏ゾーンにおける移動方向、さらに、63は予測した移動方向である。図16はこの発明の実施の形態4による移動機の通過ゾーンの移動速度および在圏ゾーン内の移動速度を示す説明図であり、図において、65-1、65-2は移動機3が通過した通過ゾーンの移動速度である。在圏ゾーンにおいて、66は在圏ゾーンにおける移動速度、2-4、2-5は移動機3が周辺ゾーンに移動した次の第2のステップで移動する可能性のある第2ステップ移動先ゾーン基地局である。

【0061】次に動作について説明する。まず、図15に基づいて移動方向から移動先基地局の予測について説明する。基地局2-1～2-3および移動機3は、位置測定システムの信号を受信し、自分の経度および緯度などの位置情報を認識する機能を持つ（移動方向認識手段）。移動機3がこれまで通過したゾーンの基地局60-1、60-2から、基地局位置情報メッセージ52の受信などにより、通過ゾーン基地局60-1、60-2の位置情報を認識し、在圏ゾーン基地局2-1の位置情報も含めてこれまでの通過ゾーンの移動方向61を認識する（移動方向認識手段）。また、移動機3は、位置測定システムにより例えば周期的に自分の位置情報を認識し、時刻T1における移動機の位置3-1、その後の時刻T2における移動機の位置3-2により、在圏ゾーン内の移動方向62を認識する（移動方向認識手段）。移動機3の通過ゾーンの移動方向61と在圏ゾーン内の移動方向62の継続性を判断し、継続性が認められる場合は、その予測した移動方向63により予測する周辺ゾーン基地局2-2、2-3を限定し、予測した移動先基地局として、ゾーン脱出予告メッセージ50に付加しクロスオーバー交換局1に通知する（ゾーン移動検出手段）。

【0062】以上のように、移動方向の継続性により予測した移動先基地局情報に基づき、クロスオーバー交換局1において設定するマルチバスコネクションの宛先基地局を限定し、ハンドオーバー制御に伴うマルチバスコネクションによるトラヒックを削減することができる。これは、列車や幹線道路を走行する自動車など、連続的

にある方向性をもって移動する乗り物に伴って移動する場合に効果が高い。

【0063】次に図16に基づいて移動速度から移動先基地局の予測について説明する。図15の動作説明にて示した移動方向の予測に加え、移動機3は、これまで通過したゾーンにおける移動速度65-1、65-2を認識する。また、移動機3は、位置測定システムにより例えば周期的に自分の位置情報を認識し、時刻T1における移動機3の位置3-1、その後の時刻T2における移動機3の位置3-2により、在圏ゾーン内の移動速度66を認識する（移動速度認識手段）。移動機3の通過ゾーンの移動方向61と在圏ゾーン内の移動方向62の継続性を判断し、継続性が認められる場合は、その予測した移動方向63により予測する周辺ゾーン基地局2-2、2-3を限定する。また、移動機3の通過ゾーンの移動速度65-1、65-2と在圏ゾーン内の移動速度66の継続性を判断し、継続性が認められ、且つ移動速度が高速である場合は、移動方向により予測した周辺ゾーン基地局2-2、2-3への移動後、第2ステップ以降に移動する可能性のある移動先ゾーン基地局2-4、2-5を予測する。このように高速移動を継続している移動機3の場合は、移動方向により予測した周辺ゾーン基地局2-2、2-3に加え、第2ステップ以降の移動先ゾーン基地局2-4、2-5を移動先基地局として、ゾーン脱出予告メッセージ50に付加しクロスオーバー交換局1に通知する（ゾーン移動検出手段）。

【0064】以上のように、移動速度が高速であっても、その移動方向と速度の継続性により予測した移動先基地局情報に基づき、クロスオーバー交換局1において設定するマルチバスコネクションの宛先基地局を限定しトラヒックを削減するとともに、ハンドオーバー頻発によるバケット消失を防止することができる。これは、航空機、列車や幹線道路を走行する高速自動車など、連続的にある方向性をもって高速移動する乗り物に伴って移動する場合や、ゾーン半径が小さくハンドオーバーを頻繁に行う必要がある場合に効果が高い。

【0065】図17はこの発明の実施の形態4による移動情報メッセージのフォーマットを示す概念図であり、図において、70は移動機3より在圏ゾーンにおける移動方向および移動速度をクロスオーバー交換局1に通知する移動機情報メッセージである。図18はこの発明の実施の形態4によるゾーン脱出予告メッセージのフォーマットを示す概念図であり、図において、71は移動機3より在圏ゾーンにおける移動方向および移動速度に関する情報を付加してクロスオーバー交換局1に通知するゾーン脱出予告メッセージである。

【0066】次に動作について説明する。基地局2-1～2-3および移動機3は、位置測定システムの信号を受信し、自分の経度および緯度などの位置情報を認識する機能を持つ。移動機3は、位置測定システムにより例

えば周期的に自分の位置情報を認識し、時刻T1における移動機3の位置3-1、その後の時刻T2における移動機3の位置3-2により、各在圏ゾーンにおける移動方向および移動速度を、移動機情報メッセージ70として、クロスオーバー交換局1に通知する（移動機情報メッセージ送信手段）。この移動機情報メッセージ70を受信したクロスオーバー交換局1は、各移動機3の各通過ゾーンにおける移動方向および移動速度を記憶する。移動機3が、通過ゾーン基地局60-2および60-1のゾーンを通過し、在圏ゾーン基地局2-1のゾーンにあり、在圏ゾーンからの脱出する可能性が高いと判断した場合は、在圏ゾーンにおける移動方向および移動速度に関する情報を付加したゾーン脱出予告メッセージ71を生成し、クロスオーバー交換局1に通知する（ゾーン脱出予告メッセージ通知手段）。クロスオーバー交換局1では、該当移動機3に関して、クロスオーバー交換局1が保持する通過ゾーンの移動方向61と移動速度65-1、65-2と、ゾーン脱出予告メッセージ71により通知された在圏ゾーンの移動方向62および移動速度66により、移動方向の継続性、移動速度の継続性および高速移動か否かの判断を行い、図16の動作で示したようにマルチバスコネクションを設定すべき周辺ゾーン基地局2-2、2-3、および第2ステップ以降の移動先ゾーン基地局2-4、2-5を決定する。

【0067】以上のように、クロスオーバー交換局1が各移動機3の移動方向および移動速度を認識するように構成しても、図16の構成と同様の効果が期待できる。

【0068】また、以上の実施の形態では、クロスオーバー交換局1と基地局2との機能をそれぞれクロスオーバー交換局1と基地局2とで分離した構成について説明したが、クロスオーバー交換局1と基地局2との両機能を兼ね備えた構成により、移動体通信網制御装置を構成しても、同様な効果が得られる。

【0069】

【発明の効果】以上のように、この発明によれば、クロスオーバー交換局から周辺ゾーンへのマルチバスコネクションを設定し、パケットを遅延させて転送し、ハンドオーバー制御によるパケット消失を防ぎ、品質の高い通信が継続できる効果が得られる。

【0070】この発明によれば、移動機およびクロスオーバー交換局において移動機ごとに通常モードとハンドオーバーモードを定義し、ハンドオーバーの可能性が高い移動機に対してのみマルチキャストコネクションを設定しパケットをフラディングし、ゾーンに定着した状態の移動機に対しては通常のコネクションを設定しパケットを転送し、移動体通信網内のトラヒック量を低減することができる効果が得られる。

【0071】この発明によれば、コネクションに要求されている通信品質により、パケット消失に対して有効なコネクションと、リアルタイム性が強いがパケット消失

の可能性のあるコネクションを、選択できるようにすることで、ハンドオーバー制御時でもコネクションの要求する通信品質を提供することができる効果が得られる。

【0072】この発明によれば、移動機にパケットのバースト到着に適合しない外部装置を接続した場合や、移動機内のパケットのバースト到着に適合しない上位処理手段との通信を行う場合、ハンドオーバー制御に伴うパケットトラヒックのバースト性を緩和することができる効果が得られる。

【0073】この発明によれば、コネクションごとに適した個別の取り出し間隔でパケットをバースト性に適合しない外部装置または、内部の上位処理手段に渡すことができる効果が得られる。

【0074】この発明によれば、クロスオーバー交換局が各移動機の状態を詳細に把握しなくても、移動機の持つ機能を活用し、移動機が主体となって移動する可能性の高い周辺ゾーン基地局を判断し、クロスオーバー交換局に通知することにより、簡易にハンドオーバー時のマルチバスコネクションの設定ができる効果が得られる。

【0075】この発明によれば、在圏ゾーン基地局の位置情報と移動機の位置情報から移動機がゾーン脱出の可能性を判断することにより、一時的な電波の乱れや、障害物の影響に耐久性のあるゾーン脱出の判断ができる効果が得られる。

【0076】この発明によれば、周辺ゾーン基地局の位置情報と移動機の位置情報から移動機が移動する可能性のある周辺ゾーンを予測し、一時的な電波の乱れや、障害物の影響に耐久性のある移動先ゾーンの予測が可能となり、また、クロスオーバー交換局が各移動機の状態を詳細に把握しなくても、移動機の持つ機能を活用し、移動機が主体となって移動する可能性の高い周辺ゾーン基地局を判断し、クロスオーバー交換局に通知することにより、簡易にハンドオーバー時のマルチバスコネクションの設定ができる効果が得られる。

【0077】この発明によれば、移動機は在圏ゾーン基地局から一括して在圏ゾーン基地局および周辺ゾーン基地局の基地局情報が入手でき、基地局情報の入手を簡易化することができる効果が得られる。

【0078】この発明によれば、移動方向の継続性により予測した移動先基地局情報に基づき、クロスオーバー交換局において設定するマルチバスコネクションの宛先基地局を限定し、ハンドオーバー制御に伴うマルチバスコネクションによるトラヒックを削減することができる効果が得られる。これは、列車や幹線道路を走行する自動車など、連続的にある方向性をもって移動する乗り物に伴って移動する場合に効果が高い。

【0079】この発明によれば、移動速度が高速であっても、その移動方向と速度の継続性により予測した移動先基地局情報に基づき、クロスオーバー交換局において設定するマルチバスコネクションの宛先基地局を限定し

トラヒックを削減するとともに、ハンドオーバー頻発によるパケット消失を防止することができる効果が得られる。これは、航空機、列車や幹線道路を走行する高速自動車など、連続的にある方向性をもって高速移動する乗り物に伴って移動する場合や、ゾーン半径が小さくハンドオーバーを頻発に行う必要がある場合に効果が高い。

【0080】この発明によれば、クロスオーバー交換局が各移動機の移動方向および移動速度を認識するようにし、トラヒックを削減するとともに、ハンドオーバー頻発によるパケット消失を防止することができる効果が得られる。これは、航空機、列車や幹線道路を走行する高速自動車など、連続的にある方向性をもって高速移動する乗り物に伴って移動する場合や、ゾーン半径が小さくハンドオーバーを頻発に行う必要がある場合に効果が高い。

【0081】この発明によれば、識別情報として適当なモジュロの巡回変数を使用し、移動機における重複パケットが検出できると同時に、消失パケットの検出や、クロスオーバー交換局と移動機間の再送制御に活用することができる効果がある。

【0082】この発明によれば、識別情報として適当な精度の時刻情報を使用し、移動機における重複パケットが検出できると同時に、パケット再生時の揺らぎ補正処理に活用することできる効果がある。

【0083】この発明によれば、第1パケット分岐手段および第2パケット分岐手段を持ち、パケット遅延手段を実現するパケット遅延バッファ手段のメモリ容量を少なく構成することができる効果がある。

【0084】この発明によれば、クロスオーバー交換局にて実現する機能と基地局等で実現する機能を兼ね備えた構成を、移動体通信網制御装置として構成しても、前記効果と同様な効果が得られる。

【図面の簡単な説明】

【図1】 この発明の実施の形態1による移動体通信網制御装置を示すブロック構成図である。

【図2】 この発明の実施の形態1による移動体通信網制御装置の動作を示すシーケンス図である。

【図3】 クロスオーバー交換局の識別情報付加手段の一例を示すブロック構成図である。

【図4】 クロスオーバー交換局の識別情報付加手段の他の例を示すブロック構成図である。

【図5】 クロスオーバー交換局のマルチバスコネクション設定手段およびパケット遅延手段の一例を示すブロック構成図である。

【図6】 この発明の実施の形態2による移動体通信網

制御装置の移動機における通常モード時の動作フロー図である。

【図7】 移動機におけるハンドオーバーモード時の動作フロー図である。

【図8】 クロスオーバー交換局における通常モード時の動作フロー図である。

【図9】 クロスオーバー交換局のハンドオーバーモード時の動作フロー図である。

【図10】 クロスオーバー交換局における通信品質記憶テーブルを示す概念図である。

【図11】 移動機におけるハンドオーバー制御時のパケット取り出し処理を示すシーケンス図である。

【図12】 この発明の実施の形態3によるゾーン脱出予告メッセージのフォーマットを示す概念図である。

【図13】 この発明の実施の形態3による基地局位置情報メッセージのフォーマットの一例を示す概念図である。

【図14】 この発明の実施の形態3による基地局位置情報メッセージのフォーマットの他の例を示す概念図である。

【図15】 この発明の実施の形態4による移動機の通過ゾーンの移動方向および在圏ゾーン内の移動方向を示す説明図である。

【図16】 この発明の実施の形態4による移動機の通過ゾーンの移動速度および在圏ゾーン内の移動速度を示す説明図である。

【図17】 この発明の実施の形態4による移動情報メッセージのフォーマットを示す概念図である。

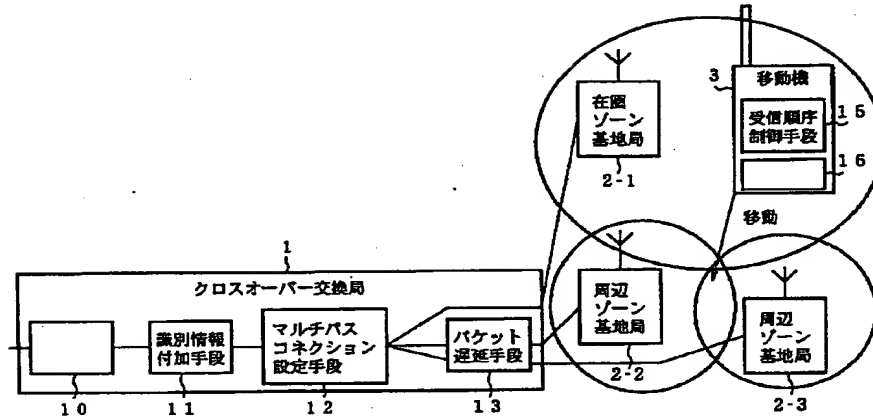
【図18】 この発明の実施の形態4によるゾーン脱出予告メッセージのフォーマットを示す概念図である。

【図19】 従来の移動体通信網制御装置を示すブロック構成図である。

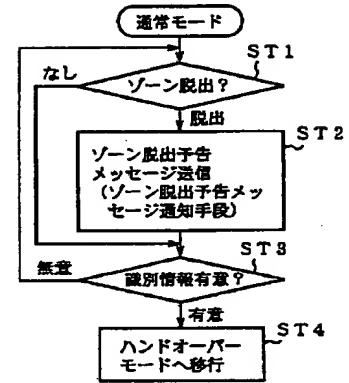
【符号の説明】

1 クロスオーバー交換局、2-1 在圏ゾーン基地局、2-2、2-3 周辺ゾーン基地局、3 移動機、11 識別情報付加手段、12 マルチバスコネクション設定手段、13 パケット遅延手段、15 受信順序制御手段、21 カウンタ手段、22 時計手段、26 パケット遅延バッファ手段、28 第1パケット分岐手段、29 第2パケット分岐手段、41 バッファ（バッファ手段）、50、71 ゾーン脱出予告メッセージ、51、52 基地局位置情報メッセージ、ST2 ゾーン脱出予告メッセージ通知手段、ST12 ゾーン定着メッセージ通知手段。

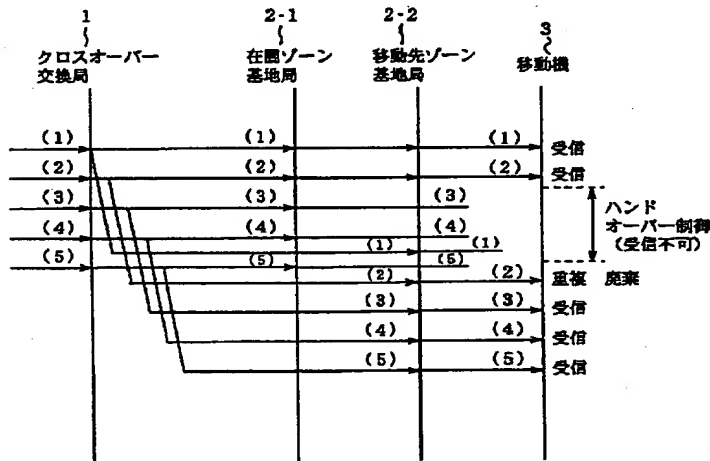
【図1】



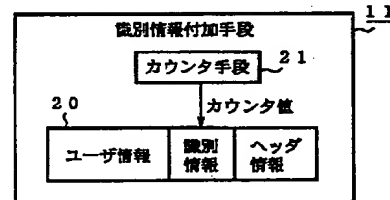
【図6】



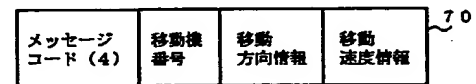
【図2】



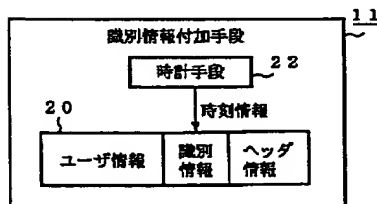
【図3】



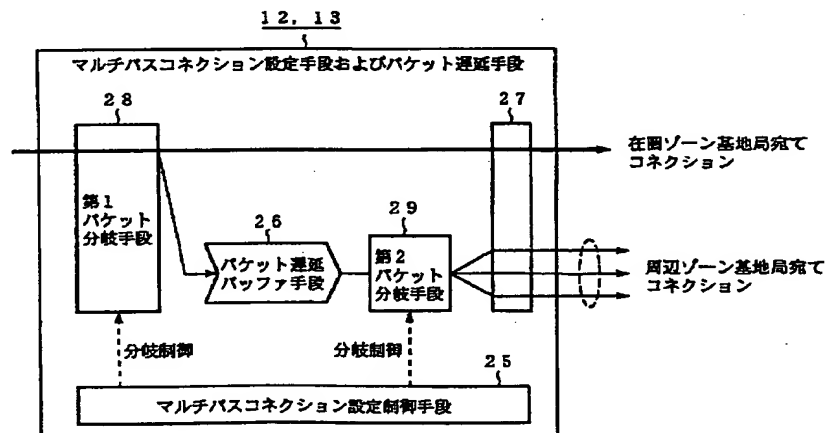
【図17】



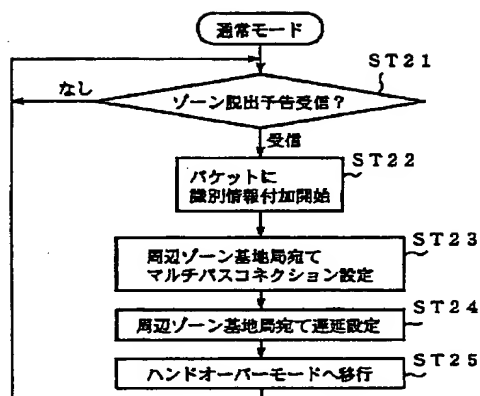
【図4】



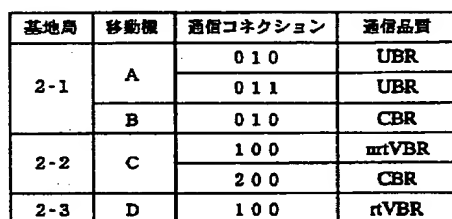
【図5】



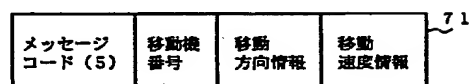
【圖8】



【图 10】

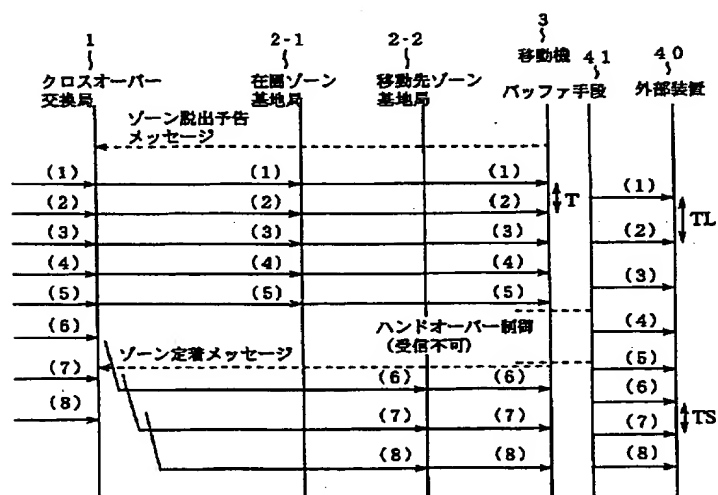


【圖 18】



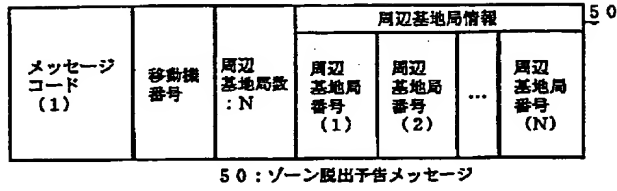
71:ゾーン脱出予告メッセージ

【圖 11】

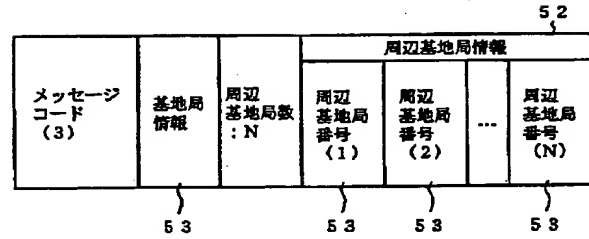


41:バッファ (バッファ手段)

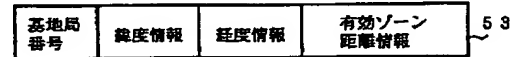
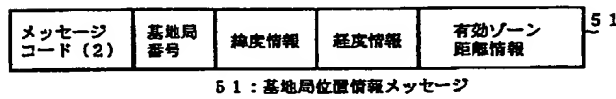
【図12】



【図14】

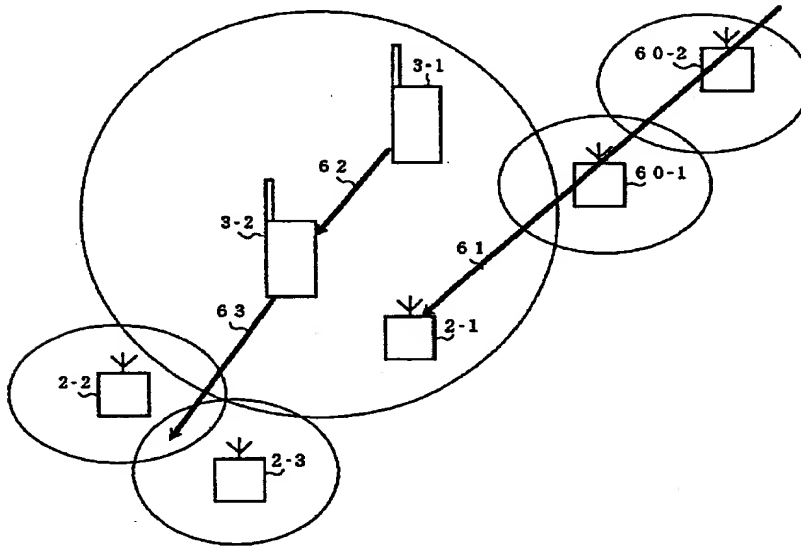


【図13】

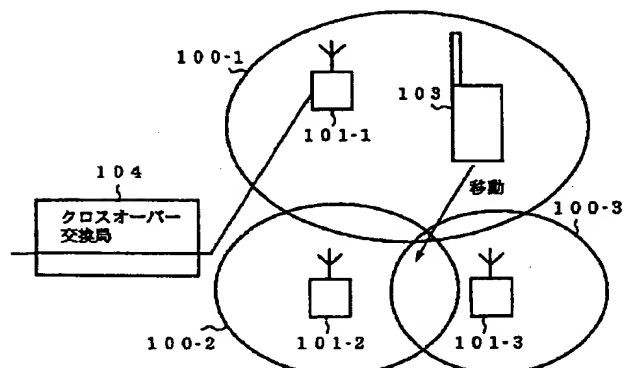


52 : 基地局位置情報メッセージ

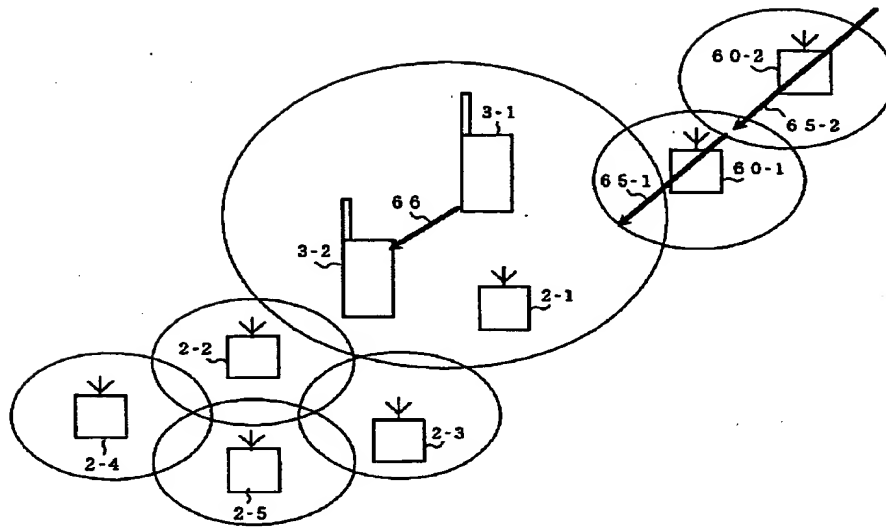
【図15】



【図19】



【図16】



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